

Liquid Honing Based On Use of Very Fine Abrasive Particles

The vapor blast liquid honing process, based on the use of particles smaller in mesh than normal silica sand, has been finding greatly increased use in the finishing of metal parts. Fine abrasives are mixed with a chemical emulsion and discharged by compressed air against the metal surface to be polished or finished. The mixture of abrasive and emulsion is discharged at the rate of 3200 ft. per sec. tip velocity, or about 10 to 15 lb. of material per min.

Vapor blasting was originated and developed by A. H. Eppeler of Vapor Blast Mfg. Co., 333 S. 16th St. Milwaukee 3, Wis. Experimental work on these fine abrasives, ranging from 100 to 2500 mesh, was accompanied by refinement of the machine and development of a cabinet that could become a part of the production line and had a means of using several types of abrasives, from a preliminary treatment with coarse mesh to a finish with any degree of fine mesh.

The process has been tested and found satisfactory on rough machined, ground and rough polished parts. It has been used successfully on supercharger impellers, art rods, bearing races, guide vanes, connecting rod bolts, gears, splines, gyroscope and other instrument parts.

Liquid honing has also been used for deburring, polishing, preparing parts for chromium plating and anodizing. Some of the burring operations have been quite intricate and this process permits a combination of burring and polishing. Some of these operations are done in stages—a coarser material at the beginning, with the next stage a little finer, and the third stage the final finish.

The Vapor Blast cabinet design is so flexible that it can be worked up into an automatic conveyor type cabinet using turntables, fixtures and belts. Tumbling baskets can also be installed in these cabinets, and all types of fixtures and automatic equipment can be built into the units. A wide variety of finish combinations can be had with one unit by a variation in abrasive, compressed air pressure, nozzle size, abrasive mix and the water and chemical emulsion.

Tests have proven that a high degree of accuracy can be obtained with the fine mesh abrasive. Parts have been polished with a tolerance of less than 0.0001 in. Moreover, in a recent run of test bars through the machine a tensile test showed an increase of 5 to 10% in strength over bars polished by hand.

Mention R798 When Writing or Using Readers Service

More New Products on Pages 17 and 19

Wide Range of Products Used In Telephone Manufacture

Reported by John N. Lynn
Rustless Iron and Steel Corp.

Materials Used in Telephone Manufacture was the subject of a paper presented by Harvey Anderson, metallurgist at the Hawthorne Works of Western Electric Co., before the Baltimore Chapter on Feb. 19.

Mr. Anderson described the wide range of products required to make a telephone and gave data on a few of the substitutions resulting from war requirements. With all of the modifications and substitutions a standardization or interchangeability of equipment has been maintained.

This feature was particularly advantageous during the repair work necessitated by the recent New England hurricane. Repair and construction crews from as far west as Denver were used during the crisis, since procedures and equipment are uniform for the entire country.

Informal discussion and a film showing the numerous steps in the manufacture of the present style of telephone desk set concluded Mr. Anderson's interesting presentation.

***Sauveur Lecture Series to Chronicle
Current Advances in Physical Metallurgy***

APR 7 1945

PITTSBURGH, PA.

Chairman John Norton and Dr. H. H. Lester present the 6th Boston Chapter Sauveur Memorial Award to Prof. Max Gensamer of Carnegie Institute of Technology. (Photograph by H. E. Handy)

What's NEW in THE METALS REVIEW

Review of Current Metal Literature

Analysis	7
Cleaning and Finishing.....	5
Corrosion	5
Design	16
Electroplating	5, 7
Foundry Practice	8, 10
Furnace and Fuels.....	10
Heat Treatment	10, 12
Industrial Uses and Applications.....	16
Inspection and Standardization.....	8
Laboratory Apparatus, Instruments.....	8
Lubrication and Friction.....	14
Machining and Machine Tools.....	12, 14
Materials Index	4
Miscellaneous	16
New Books	18
Ores and Raw Materials.....	4
Powder Metallurgy	5
Properties of Metals and Alloys.....	4
Refractories and Furnace Materials.....	10
Salvage and Secondary Metals.....	10
Smelting and Refining.....	4
Statistics	16, 18
Structure	5
Temperature Measurement and Control.....	8
Testing	7
Welding	14-15
Working (Rolling, Forging, etc.).....	12

Other Departments

Review of Products, Equipment, Materials.....	17, 19
Review of Manufacturers' Catalogs.....	20
Meeting Calendar	18
Employment Bureau	9
Reader Service Coupon.....	17
Advertising Index	20

PASS-A-ROUND

	Name	Item No.
<p>Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.</p>		

Gensamer Outlines Theory Of Plastic Deformation of Metal In Sixth Annual Lecture

Reported by Horace Ross
Henry Disston & Sons, Inc.

Boston Chapter A.S.M. held its sixth annual Sauveur Night on Jan. 5 at the Hotel Sheraton, Boston. A year ago Boston took a bold step in setting up a continuing committee on the Boston Sauveur Memorial Lectures under the able chairmanship of Dr. H. H. Lester of Watertown Arsenal. It has been the program of this committee to choose a subject in the field of physical metallurgy of most active development and current interest and to secure as the speaker the best man in America capable of presenting the subject.

On this occasion the chosen subject was "The Plastic Deformation of Metal" and the speaker was Max Gensamer, professor of metallurgical engineering, Carnegie Institute of Technology, Pittsburgh.

Dr. Gensamer outlined the requirements for an adequate theory of the plastic deformation of metal. He then described in detail the theory as now accepted, and fully illustrated by experimental data the extent to which the theory has been confirmed by research on single crystalline and polycrystalline substances. Finally his talk indicated where experiment had up to now fallen short of alignment with the pure theory and indicated directions in which further research would be helpful toward a more complete understanding of this important subject.

As the coffee speaker, Erwin Canham, managing editor of the *Christian Science Monitor*, talked on "War Reporting Through Censorship." He described the problems of a newspaper in confirming and publishing as much war news as is consistent with the limitations of national security under the code set up by the Office of Censorship.

A report of the Boston Sauveur Memorial Night speakers committee, outlining the plans made for the lecture series, will be found on page 9.

New Organization Formed Known as Detroit Spectrographer's Society

The first meeting of the Detroit Spectrographer's Society was held Jan. 22 at the Rackham Memorial Building in Detroit. This newly formed technical society has for its purpose the dissemination of knowledge pertaining to spectro-chemical analyses and to assist in the development of improved methods and technique.

Officers of the new society are William Edgar, Federal Mogul Corp., chairman; Dean E. Shields, Packard Motor Car Co., vice-chairman; M. M. White, Harry W. Dietert Co., secretary; E. A. Boettner, Wyandotte Chemical Corp., treasurer. The executive council consists of R. E. Nusbaum, General Motors Research Laboratory; John Schuch, Harry W. Dietert Co., and William Sundwick, Ternstedt Mfg. Div.

A.S.M. Appoints New Eastern Representative Wells Goes to Cleveland Business Office

Robert S. Muller has joined the staff of the American Society for Metals as eastern representative with offices at 55 West 42nd St., New York City. Mr. Muller was recently with the U. S. Gypsum Co. and was formerly in the U. S. Army Air Corps. He will handle sales in the east for METAL PROGRESS and THE METALS REVIEW and other activities of the Society.

Chester L. Wells, who has been eastern representative for several years, has taken up duties on the business staff in Cleveland.

Fort Wayne Is Host to A.S.M. National Officers



Reported by Edward J. Pavesic
Studebaker Aviation Division

Fort Wayne Chapter's largest attendance of the season greeted A.S.M. national officers when they visited the chapter on Jan. 23. At the speakers' table are, left to right: L. C. Powell, chief metallurgist of the Warner Automatic Division, Borg Warner Corp.;

Technical Chairman J. D. Nisbet, vice-chairman of the Ft. Wayne Chapter; W. H. Eisenman, national secretary; E. J. Pavesic, chairman of the Ft. Wayne Chapter; Kent R. Van Horn, national president; and G. V. Craighead, South Bend district representative of the Aluminum Co. of America. Dr. Van Horn gave the technical address on "Applications of the Aluminum Castings and Wrought Alloys".

New Jersey Panel Discusses 3 Modern Heat Treat Techniques

Reported by F. P. Kristufek
Research Laboratory, U. S. Steel Corp.

Three modern heat treating techniques were thoroughly discussed at the Jan. 15th panel meeting of the New Jersey Chapter A. S. M. Gerald B. Duff, president of the Gerald B. Duff Co., spoke on controlled atmosphere heating, Theodore R. Kennedy, development engineer of Ajax Electrothermic Corp., discussed induction heating, and W. M. Gager of E. I. du Pont de Nemours and Co. spoke on salt bath treatment.

Gas atmosphere furnaces may be readily adapted for widely varying heat treating jobs, stated Mr. Duff, and extremely close temperature control can be maintained. Controlled atmosphere heating may be made entirely automatic by the utilization of conveyor belts and pyrometers. Controlled atmospheres eliminate danger of corrosion from dragouts as well as reducing the human factor to a minimum.

The speaker explained that the work is subjected to a "soft" heat action immediately on entering the furnace since the poor heat conductivity of gases results in a gradual heating action. Usually, the only treatment required after subsequent quenching is removal of the quenching medium from the work.

Disadvantages of controlled atmosphere heating, as enumerated by Mr. Duff, are the problem of equipment maintenance, such as oiling of pumps and motors and care of pyrometers, and the explosion hazard with some atmospheres which necessitates suitable safety precautions.

Induction heating is admirably suited for large scale production heat treatment on parts where suitable conveyor feed or timed operations may be used, explained Mr. Kennedy with the aid of slides. Speed of heating the product is very great and the unusually short heating time results in the formation of very little scale on the product. The speaker stated that induction heating units may be operated with a maximum of cleanliness, require little space, and avoid giving off excessive heat as the heat is sharply confined to the desired area of the product.

Some of the limitations, as enumerated by Mr. Kennedy, are the comparatively high cost of the equipment where production is low, the need for capable maintenance, and the necessity for using positive means to control temperatures or heating time to secure the best results.

In a broad sense, the heat treatment of steel with salt baths is much the same as in gas atmosphere furnaces, Mr. Gager pointed out in his portion of the program. Both methods surround the work with an atmosphere to protect it from oxidation, or to add carbon or nitrogen to the surface layers.

Compared to gas furnaces, salt baths are more flexible, work can be entered or removed at any time, atmosphere around the work is not disturbed. Baths, in general, surround the work with a more uniform temperature than a gas furnace and they protect the work with a film of molten salt during the transfer from the furnace to the quench.

Nearly all operations done with salt baths can be duplicated by gas atmospheres or vice versa. As an exception to gas processes, salt baths cannot produce a true carbon case and neither have they successfully been used, to date, to produce a deep nitrided case. On the other side, gas or induction hardening cannot be used for the ever increasing popular processes like austempering, martempering and isothermal quenching. Here, salt is necessary.

Graphite Section of W. P. B. Dissolved; Former Chief Now With Mansfield Brass

W. E. Renwick, who is now associated with the Mansfield Brass Foundry, Inc., as product engineer, has been with the Graphite Section of the War Production Board at Washington, D. C., for the past two and one-half years. During the past year he was chief of the Section until its work was completed and the Section dissolved. Previously, from 1927 to 1942, he was in the engineering department of The Ohio Brass Co., Mansfield, Ohio.

Mr. Renwick's academic training was in electrical engineering at Purdue University. A major part of his later experience had to do with metallurgy, research, product development and control of production processes.



W. E. Renwick

Strip Mill, New Shapes, Finer Finishes Forced Rapid Progress in Art of Roll Making

Reported by J. B. Segada
Metallurgist, Youngstown Sheet and Tube Co.

"The manufacture of rolls is an art rather than a science," said A. E. Murton, manager, Roll Department, Continental Foundry and Machine Co., in a lively discussion at the January meeting of the Calumet Chapter. One reason for this is that it has been impossible to establish satisfactory data from test bars that could be transposed either mathematically or empirically into roll performance.

Another reason is that no two mills are exactly similar even when rolling identical sections. In the past 15 years, the development of the strip mill and the demands of the steel users for new shapes and finer finishes has forced the manufacturers of rolling mill rolls to make rapid progress and changes in the art of roll making.

There are two broad classifications of rolls, Mr. Murton stated—steel (regular carbon or alloy), and iron (carbon or alloy chilled iron and grain rolls).

Surface finish requirements of the rolled product govern to some extent the grade of roll. The features the roll manufacturers look for are ductility and shear resistance combined to the best possible advantage with resistance to abrasion or wear. Since high tensile strength material frequently has poor properties in shear and ductility, all rolls produced are compromised to meet as many as three or four characteristics which are necessary in a particular application.

All rolls are cast in a vertical position. The mold is made in two halves. The metal enters the mold at the bottom and through a sprue gate which is set at a tangent to the lower neck. A swirling action is thereby produced which forces the heavier metal to the periphery of the mold. Lighter material such as slag, sand and other impurities, is forced to the center of the rising metal and thus carried to the sink-head portion of the mold.

Cast iron rolls are allowed to cool to room temperature and are then machined. Alloy iron rolls are heat treated upon removal from the mold and are then machined.

Plain carbon steel rolls are made in a range of 0.50 to 1.00% carbon with normal manganese, silicon, sulphur, and phosphorus. This grade possesses good ductile properties but tends to rough up. Rolls of this type are used in some roughing operations.

Intermediate and finishing rolls are frequently made

of alloy steel to suit the particular application. The product finished on alloy rolls does not possess as good surface characteristics as a similar product finished on cast iron rolls.

Chilled iron rolls are produced by super-cooling the outside surface of the roll. Carbide formers increase chill depth. Nickel in proportions generally used has the reverse effect of decreasing the chill zone.

Grain rolls are super cooled. They are graphitic throughout the entire cross-section, and are always alloyed. In all cases the silicon is high enough to precipitate graphite even though the metal is cast against a chill mold. Grain rolls will not give as fine a finish to rolled steel but are less susceptible to spalling than the chill type roll. Grain iron rolls are used in merchant mills, bar mills and structural mills, as well as in rolling strip.

Wescott Compares Quenching Action of Oils and Water

Reported by Herman P. Abel
Delco-Remy Division, G.M.C.

In a talk on "Industrial Oils and Oil Quenching" before the Muncie Chapter on Feb. 14, Blaine B. Wescott, chief metallurgist of Gulf Research and Development Corp., compared the quenching characteristics of high speed quenching oils, ordinary quenching oils, and water by means of cooling curves. He quoted examples to show that in many cases quenching in high speed oils will produce hardening unattainable in ordinary oils and comparable to the hardening in water but without the serious distortion that attends water quenching.

The harmful influence of scale and the effects of the oil temperature and degree of agitation on the quench in high speed and ordinary oils were shown by center cooling curves for specimens of S.A.E. 1095, S.A.E. 4650, and 18-8 stainless steel. Above 125° F., oil bath temperature has virtually no effect on the quenching rate in oil. Agitation increases the severity of all oil quenches but will not equalize high speed and ordinary oils agitated to the same degree. Agitation tends to produce more non-uniformity of quench in a slow oil than in a high speed oil.

In conclusion, Dr. Wescott stated that none of the ordinary properties of quenching oils such as viscosity, flash and fire points, give the slightest indication of the quenching power of oils. He then described the "five-second test," a simple timed quench which will establish the relative capacities of quenching media to remove heat and suggested this test as the basis for a performance specification on quenching oils.

Discussions on heat treating problems of the members present ended the session.

National Officers Visit Notre Dame Chapter

The Notre Dame Chapter observed National Officers' Night at the January meeting. Kent R. Van Horn, president of the A. S. M., spoke on the "Metallurgy of Aluminum Alloys." National Secretary Bill Eisenman reported on the wartime activities of the Society and spoke briefly of his agricultural interests.

Rimbach Organizes Research Service

Richard Rimbach, consulting engineer, has established an industrial research and development service at 1117 Wolfendale St., Pittsburgh. The Rimbach organization is designed to serve small companies in any of the following ways: (1) By directing the company's control laboratory on a part-time basis; (2) by farming out problems to the best qualified commercial or endowed laboratories and directing the work; (3) by arranging for the testing of new products; (4) by preparing bibliographic reports; (5) by searching the U. S. Patent Office Gazette for pertinent subjects; (6) by statistically analyzing data to determine estimates of reliability, significance and correlation; (7) by the preparation of reports with graphical or pictorial presentation of data.

Lehigh Valley Celebrates 25th Anniversary



Bradley Stoughton Night and Silver Anniversary Combined

Reported by R. L. Deily
Bethlehem Steel Co.

The seventh annual Bradley Stoughton Night and the 25th Anniversary of the Lehigh Valley Chapter were celebrated on Feb. 2 at the Hotel Bethlehem. The disturbing influence of war prevented Professor Stoughton's attendance because of his urgent commitments in Washington. Otherwise, the evening's meeting was an outstanding success.

The annual Stoughton Award to the outstanding metallurgist of the Lehigh Valley was made to G. V. Luerssen of the Carpenter Steel Co. because of his special work on tool steels, his numerous technical papers and his inspiration to the local metallurgical society. In accepting, Mr. Luerssen paid tribute to Professor Stoughton's continuing influence as an educator and friend.

Early history of the chapter was given by A. P. Spooner of the Bethlehem Steel Co., who told of the activities of Robert Shimer, Ben Shepherd and John Halbing, who, together with several other Lehigh Valley metallurgists and Bill Eisenman, were responsible for the founding of the local group.

"Welding Versus Steel Quality" was the topic of the technical talk presented by Sam Hoyt of Battelle Memorial Institute. Dr. Hoyt described the development of weld tests as part of war research in conjunction with the aircraft industry.

Welding troubles in SAE 4130 aircraft tubing were often due to variations between open-hearth heats and also to variations in the mill processing of the cold drawn and heat treated tube. Several samples of the special weld test developed by Battelle for the study were shown and described by Dr. Hoyt.

A lively discussion on weldability followed the talk and included Drs. Doan and Stout of Lehigh University, Dr. Herty and Mr. Foulkes of Bethlehem Steel Co., and others.

Named Vice-President of E. F. Houghton

D. J. Richards has been elected vice-president in charge of sales, for E. F. Houghton & Co., Philadelphia. This is a newly created position recently authorized by the stockholders. Mr. Richards has been connected with the sales department since 1917. He was formerly general sales manager of the Central Division, with headquarters in Pittsburgh, and came to Philadelphia in 1943 as assistant director of sales.



D. J. Richards

Heath Leaves Allison Division for Climax

R. L. Heath has recently joined the Climax Molybdenum Co. in the capacity of metallurgical engineer. His headquarters at present are in St. Louis, Mo. Before coming with Climax he was chief metallurgist of the Allison Division of General Motors Corp. at Indianapolis, Ind. While there he served on several S.A.E. committees dealing with aircraft engine materials and packaging.

Mr. Heath was also active in the American Society for Metals, having been chairman of the Indianapolis Chapter, and chairman of the Constitution and By-Laws Committee in 1940-41.

Speakers and guests at the twenty-fifth anniversary meeting of the Lehigh Valley Chapter A.S.M. were (left to right): A. P. Spooner, Bethlehem Steel Co., who outlined the history of the chapter; R. D. Stout, chapter chairman; G. V. Luerssen, Carpenter Steel Co., recipient of the Stoughton Award; S. L. Hoyt, of Battelle Memorial Institute, guest speaker; C. H. Herty, Bethlehem Steel Co., A.S.M. national vice-president; R. L. Deily, chapter secretary-treasurer.

A.S.M. Nominating Committee

THE CONSTITUTION of the A.S.M. provides that "prior to April 15 of each year the names of the Nominating Committee shall be published by the President for the benefit of the members of the Society in one of the publications of the Society."

Because of the delay in the publication of THE METALS REVIEW, which usually has contained the names of the members of the Committee, the Nominating Committee for 1945 will be listed in the April issue of METAL PROGRESS.

Plastics Predicted for Gadgets And Trim of Post-War Auto

Reported by E. V. Ivanso
Metallurgical Engineer, Steel Sales Corp.

Members of the Detroit Chapter journeyed somewhat afield from their usual realm of metals on Jan. 8, when a talk on "Use of Plastics on Automobiles, Past and Future" presented by Wm. M. Phillips, head of the electro-chemistry department in the Research Laboratories Division of General Motors Corp., lifted the edge of the curtain hiding the much publicized post-war drama of plastics versus metals.

A display board showed the plastic parts (approximately 5 lb.) incorporated in the latest pre-war model of a medium priced General Motors car weighing a total of about 3500 lb. Various other plastic parts on the board represented war products such as helmet liners, trench mortar fuses, airplane pilot seats, window screening, fighter plane canopies, and landing lights. Others were of a domestic nature, such as a refrigerator door inner liner, an automobile fender, fabrics, etc.

Combinations of physical properties such as we commonly expect of various metals, are apparently difficult to attain as yet in plastics. Low temperature brittleness in some and moderately high temperature softness in others seem to be the most common limitations.

As to automotive use, a good fender is practically obtainable through the use of laminated glass cloth and plastic, the chief limitation being in the as yet slow method of production. Much opportunity exists in the field of "gadgets" and trim, while the so-called rubber-like plastics will probably find various applications for wire coverings and for other functions where natural rubber does not suffice.

In short, the post-war car will very likely utilize plastic materials to a greater extent than did the pre-war cars, but significant displacements of metal and other standard materials still await further development and study.

Future Course of Geneva Steel Plant Charted by President

Reported by R. R. Robinson
Technical Engineer, Colorado Fuel and Iron Corp.

The Geneva Steel Plant near Provo, Utah, operated by a responsible management in the interest of the public and common good, will not constitute a threat to the future of the Colorado Fuel & Iron Corp. in the post-war years, but if they should attempt to engage in full competition it could spell the doom of one and possibly both, to the detriment of the territories whose interests they should serve, Walther Mathesius, president of the Geneva Steel Co., told the Pueblo Chapter of the American Society for Metals at a dinner meeting on Feb. 15.

If the Geneva Plant is to market its products in the western territory at a lower delivered price as compared to eastern competition by way of the Panama Canal, equitable adjustments of railroad freight rates will be required, Mathesius pointed out. He said that the railroads were interestedly aware of this situation and that their cooperation could be counted upon.

While cautious about postwar commitments in view of possible changes in control of the two plants, Mr. Mathesius made it plain that in his opinion the Geneva plant should not attempt to convert its present facilities so as to enter in direct competition with the Colorado Fuel & Iron Corp.

First Fully Integrated Plant in West

Specifically, in the question and answer period which followed his address, he declared that he believed that it would be unwise for Geneva, after the war, to enter into the production of rails and rail fastenings, in view of the established relationship between the railroads and the Colorado Fuel & Iron Corp., and further, because there are already ample producing facilities for these commodities in the United States generally as well as in the western area. Therefore, he believes, it would not be a field that Geneva would find financially attractive.

Similarly, in the production of wire and wire products, facilities now operating in the west, including those of the Colorado Fuel & Iron Corp., have ample capacity to supply all market demands which could reasonably be expected to be realized post-war in the western territory.

Present production at Geneva, he said, is definitely limited to war needs, and consists chiefly of steel plates and structural steel shapes for use in west coast shipyards, and of shell steel billets.

To the funds supplied in support of war production by the U. S. Government for building of the plant, United States Steel Corp., without fee or other consideration, has added its technical knowledge and operating experience and Utah has supplied most of the raw materials and manpower. The operating program of the Geneva Plant differs from conventional types in one major respect, and that is that it does not contemplate substantial purchases of market scrap. "It is the first fully integrated steel plant west of the Rocky Mountains," he said.

Flat Rolled Products Aim of Reconversion

Coming to the question of postwar plans, Mathesius said, "We hope that our efforts will have developed, and will continue to develop, with the cooperation of other enterprises, a permanent contribution to the industrial growth and economic strength of this area."

"I have urged repeatedly, and I should like to do so again now, that while we at Geneva are producing plates, shapes, shell steel and other war needs, it should become the accepted and jointly undertaken task of the leaders and planners, the economists and business men throughout these western states, to chart the course toward the steel markets which in the years of peace to come may be supplied by a growing western steel production operated profitably on the basis of sound economic principles, with fair participation by all producing plants, which can in this manner contribute to the common good."

Mathesius pointed out that before the war, virtually all steel sheets and tinplate came from the east, and said that plans at Geneva for postwar conversion are based on the idea of turning out light-gage, flat-rolled products.

Structural steel shapes, produced also at the Minnequa Plant but never sold by it on the west coast, logically could be produced for that area by Geneva, he said.

Mr. Mathesius, who before becoming head of Geneva, was vice-president, operations, for the U. S. Steel Corp. of Delaware, was introduced by W. H. Bailey, chief engineer of the Colorado Fuel & Iron Corp., a long-time friend and former business associate.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad,
Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. ORES & RAW MATERIALS

Production; Mining; Beneficiation

- 1-5. Large Scale Working of Adirondack Magnetites. Frank J. Oliver. *Iron Age*, v. 155, Feb. 1, '45, pp. 52-56. Methods of beneficiating; crushing and fine grinding enables a concentrate containing up to 70% iron to be obtained by magnetic separation. The product is then sintered.
- 1-6. Ore Concentration and Milling. F. M. Jardine. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 63-65. New types of equipment noted, and sink-float continues to gain.
- 1-7. Non-Metallic Minerals. Oliver Bowles. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 75-80. New deposits, new methods, and new uses for a variety of industrial minerals.
- 1-8. Metallurgy of Ferro-Alloy Ores. Jerome Strauss. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 97-98. Many processes still war secrets; new manganese and nickel plants closed down.
- 1-9. Selenium Recovery. A. G. Arend. *Chemical Age*, v. 52, Jan. 6, '45, pp. 11-14. Development in metallurgical processes.
- 1-10. Alcoa's New Alumina Development Laboratory. *Chemical Industries*, v. 56, Jan. '45, pp. 54-58. Costing \$750,000, this flexible experimental plant can reproduce with variations the new Alcoa "combination" process for alumina from low-grade bauxites.
- 1-11. Mineralogy of the Manganese Oxides. Michael Fleischer. *Electrochemical Society Preprint no. 86-23*, Oct. '44, 1 p. Mineralogical characteristics of manganese ores are probably of major importance in determining their behavior in dry batteries. Available data on crystal structure, X-ray diffraction patterns, physical properties, and chemical composition of 12 minerals are summarized, with pertinent discussion. Identifications based on physical properties are highly uncertain, owing to the variability and overlapping of these properties. Hardness is a particularly poor criterion. Optical study by reflected light makes identification of well-crystallized material possible but identification of fine-grained material in this way is as yet uncertain. X-ray powder photographs are the best means.
- 1-12. Flotation and Heavy-Media in Ore-Dressing Spotlight. S. J. Swinson. *Engineering & Mining Journal*, v. 146, Feb. '45, pp. 116-118. With new plants being built and older ones expanded, development of new mineral-dressing equipment became noticeable once more. Flotation-machine and fine-grinding theories received increased attention.

2. SMELTING AND REFINING

- 2-14. Copper and Copper Alloys. G. L. White. *Canadian Metals and Metallurgical Industries*, v. 8, Jan. '45, pp. 14-19. Outlines briefly the manufacturing processes involved in the production of primary brass and copper materials.
- 2-15. The Possibility of Gas Saving (During the Smelting of Metals) in a Smelter. Gottlieb Eisenmann. *Die Giesserei*, v. 31, Jan. '44, pp. 8-11. Factors controlling the industrial application of gas are investigated. Advantages of preheating the air.
- 2-16. Steel Ingots. E. Barber. *British Steelmaker*, v. 11, Jan. '45, pp. 14-18. Solidification of steel; cooling of steel; reducing segregation; methods of ingot casting; advantages of bottom pouring; top pouring; steel classification; the nozzle.
- 2-17. Control of the Acid Open Hearth by Means of Slag Fluidity Tests. G. R. Fitterer. *British Steelmaker*, v. 11, Jan. '45, pp. 29-33. Deals specifically with a search for the equilibrium which the acid open-hearth reportedly approaches. (Reprinted from *Iron Age*, Oct. 26, '44.)
- 2-18. The Electrochemistry of the Dow Magnesium Process. Ralph M. Hunter. *Electrochemical Society Preprint no. 86-30*, Oct. '44, 12 pp. Drying of magnesium chloride from liquors to cell feed described; factors affecting the choice of fused-salt bath compositions discussed, and it is pointed out that the selection cannot be made from an electrochemical standpoint only, but that the impurities present in the raw materials must be considered. Various impurities enumerated, and their effects on the process and products traced, particularly the effects of impurities found in sea water, which were not encountered in Michigan brines.
- 2-19. Further Studies of Functions of Chloride in Copper Refining Electrolyte: Bismuth. Yu-Lin Yao. *Electrochemical Society Preprint no. 87-2*, April '45, 8 pp. Increasing the chloride concentration in a copper refining electrolyte up to about 15 mg. per liter decreases the tendency for the codposition of bismuth with copper. The beneficial effect is greatest at the critical chloride concentration. Above the critical concentration this beneficial effect still exists but is less pronounced. A working hypothesis is proposed to account for these phenomena and the chief functions of chloride in copper refining electrolyte are summarized.
- 2-20. Extraction of Pure Cobalt by Electrolysis. N. Fedotov. *Electrochemical Society Preprint no. 87-3*, April '45, 3 pp. Starting with a crude cobalt oxide cake, this is converted into cobalt sulphate and electrolyzed in a diaphragm cell, using Duriron anodes. Catholyte and anolyte are separately circulated and regenerated. Excess iron in the anolyte is removed by soda ash, and nickel in the catholyte by dimethylglyoxime, thus keeping these impurities very low in concentration. The cathode deposit analyzed 99.9% Co, 0.02% Fe, and 0.05% Ni.
- 2-21. Recent Developments and Trends in Melting, Refining and Casting. *Metals and Alloys*, v. 21, Jan. '45, pp. 110-113. General trend in the processing of liquid metals, and individual reviews of each important industrial metal melting and metal casting field.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

1-5; 2-16-17; 3-23-25-27; 6-14; 10-13; 11-11; 14-51; 16-15-16-23-24; 17-14; 21-13; 22-61; 26-42-44; 27-30.

Cast Iron

10-14; 14-56-57-60; 27-36.

Cast Steel

14-50-53; 23-50.

Wrought Carbon Steel

3-33-35; 6-15; 7-30; 8-13; 12-19-35; 18-39; 19-33; 22-56-59-60-62-89-91; 23-37.

Alloy Steel

3-29-34; 6-12-17; 12-19; 14-50; 18-38-51; 20-44-64.

Stainless and Heat Resisting Steel

3-36; 4-5; 9-18; 18-48; 19-42; 22-64.

Tool Steels and Carbides

3-22; 15-5; 18-36-47; 20-54-55.

Ferro-Alloys

1-8; 26-54.

General Non-Ferrous

2-23; 12-23-28-31-33; 14-62; 26-45-55.

Aluminum

1-10; 2-25; 3-23; 4-4-6; 8-9; 10-9-10; 12-25; 14-55; 15-4; 18-37; 19-47-50; 22-69-71-75-76-90; 23-57-58; 24-18; 26-32-39.

Magnesium

2-18-26-27; 3-32; 4-3-7; 7-26; 12-25; 14-58; 19-31-49; 22-69; 23-58; 26-39-46.

Copper, Brass and Bronze

2-14-19; 3-24-31; 4-4-6; 8-9-15-16; 10-12; 12-28; 15-3; 18-35-50; 20-55; 26-30-34-35-36-41-50.

Nickel, Monel and Nickel Alloys

3-30; 8-16; 19-45.

Lead and Lead Alloys

2-22; 7-25; 8-11; 21-18; 22-86; 26-31-34-35-49.

Tin and Tin Alloys

4-6; 8-19; 21-18; 22-65-92; 26-37-52.

Zinc and Zinc Alloys

4-4-6; 8-15; 10-8; 16-19-25; 20-59; 26-33-34-40-51.

Miscellaneous and Minor Metals

1-9-11; 2-20; 3-26; 8-10-13-15; 10-16; 26-38-47-48-53-55.

- 2-22. The Lead Industry. R. A. Perry. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 66-67.

Progress made in certain features of smelting and refining practice.

- 2-23. Non-Ferrous Physical Metallurgy. Michael B. Bever and Carl F. Floe. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 90-96.

Advances in processing, fabrication, and surface treatment.

- 2-24. Slag Systems. Helen Towers and Jan M. Dworek. *Journal of the West of Scotland Iron and Steel Institute*, v. 51, Part 6, 1944-44, pp. 123-132.

Viscosity determinations of the system MnO-Al₂O₃-SiO₂.

- 2-25. Melting Aluminum. Hiram Brown. *Modern Metals*, v. 1, Feb. '45, pp. 16-20.

Melting of aluminum preparatory to casting. Handling the metal, composition characteristics, furnaces used, melting, combustion gases and their effect on the metal, proper melting temperature control and fluxing.

- 2-26. Magnesium from Dolomite. W. M. Pierce, R. K. Waring, L. D. Fetterolf and G. T. Mahler. *Metal Industry*, v. 66, Jan. 26, '45, pp. 50-52.

Phases of general interest, of an extensive investigation carried out by the New Jersey Zinc Co. on the Pidgeon process for the manufacture of magnesium. (Presented to the American Institute of Mechanical Engineers.)

- 2-27. Magnesium from Dolomite. W. M. Pierce, R. K. Waring, L. D. Fetterolf and G. T. Mahler. *Metal Industry*, v. 66, Feb. 2, '45, pp. 69-70.

Some developments in the ferrosilicon process: effects of briquette size, degree of vacuum, silicon efficiency, retort life, condensation and the charging and discharging processes.

3. PROPERTIES OF METALS AND ALLOYS

- 3-22. Chart of Comparable Tool Steels. *Iron Age*, v. 155, Feb. 1, '45, pp. 44-47.

Table answers many questions regarding the selection of tool steels; trade names and manufacturers of the nine main classifications of tool steels, and auxiliary tables summarize the application, approximate heat treatment, and chemical composition of each type not strictly within the type analyses.

- 3-23. Recovery of Cold-Worked Aluminum Iron as Detected by Changes in Magnetic Properties. J. K. Stanley. *Metals Technology*, v. 12, Jan. '45, T. P. 1767, 10 pp.

Shows the feasibility of using magnetic methods in detecting internal strains; how such properties as permeability, remanence, and coercive force change on cold working of aluminum iron and how these magnetic properties change during the annealing below the recrystallization temperatures. Work conducted to see how strains are relieved at low temperatures.

- 3-24. Porosity in Copper Alloy Castings. K. Strauss. *Canadian Metals and Metallurgical Industries*, v. 8, Jan. '45, pp. 27-28.

Causes and prevention in materials with high copper content. Article deals with gas porosity only as encountered in alloys of high copper content, such as tin bronzes, phosphor bronzes and gun metals.

- 3-25. A Study of Work-Hardening and Reannealing of Iron. M. Balicki. *Iron and Steel Institute Advance Copy*, Dec. '44, 43 pp.

Changes in various properties of Armco iron wires resulting from 12 different degrees of work hardening, and subsequent annealing in a vacuum. On the same samples, or on exactly similar material, the following properties were determined: Hardness, electrical resistivity, elastic limit from the bend test, plastic limit, ultimate stress, uniform elongation, springiness, thermoelectric properties and microstructure. Attention was paid to the effect of the time of annealing and to the order of the inaccuracy caused by aging. Some other effects of which account should be taken are also indicated. A survey of the changes induced by reannealing confirms the presence of three phenomena—strain aging, recrystallization and crystal growth. 70 ref.

- 3-26. Lithium. *Electrochemical Society Bulletin*, Jan. '45, p. 2.

Properties and uses.

- 3-27. Ferrous Physical Metallurgy. Francis M. Walters, Jr. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 87-89.

Progress reported in studies of hardenability, graphitization, embrittlement, and dilatometry.

- 3-28. Creep of Metals. James L. Erickson. *Light Metal Age*, v. 3, Jan. '45, pp. 22-23, 26-27.

Introduces the light metal technician to creep; there is a large demand from the aircraft industry for high strength, weight saving metals and metal products which have the ability to retain their strength at temperatures above normal, and which remain unaffected by large temperature variations.

- 3-29. Some Recent Developments in Engineering Materials. Archibald Black. *Mechanical Engineering*, v. 67, Feb. '45, pp. 101-108.

National Emergency steels; low cost alloy steels; isothermal transformation of steel; interrupted quenches; cold treatment of steel; steel hardenability calculated from composition; high strength cast irons and cast steels; leaded steels; graphitic steels; boron steel; nitrogen as an alloying element in steels; nitride case hardening of stainless steels; silicon impregnation of steel; new magnetic alloys; Ni-Fe-Ti alloys. 98 ref.

- 3-30. Some Engineering Properties of Nickel and High-Nickel Alloys. B. B. Betty and W. A. Mudge. *Mechanical Engineering*, v. 67, Feb. '45, pp. 123-129.

Summarizes the principal properties of approximately a score of important wrought and cast nickel materials which contain more than 50% of nickel and which have been used extensively for power equipment, petroleum, laundry, food service, household equipment, pickling, roofing, and paper and pulp industries because of their excellent strength and corrosion resisting characteristics. Some economical methods for construction of special equipment.

- 3-31. Nickel-Bronze Castings. E. Portman. *Metal Industry*, v. 66, Jan. 12, '45, p. 26.

Describes the changes found necessary with the alloy which had previously given satisfactory results to one with a lower tin content, to obtain equally good results. (Condensed from *Metals and Alloys*.)

- 3-32. Magnesium Alloys and Their Application. D. A. Tooley. *Machinery*, v. 51, Feb. '45, pp. 146-151.

Characteristics and properties of the various compositions available commercially, and factors to be considered in the fabrication of parts from these alloys.

- 3-33. Effect of Boron on Machinability and Hardenability. T. G. Harvey. *Iron Age*, v. 155, Feb. 15, '45, pp. 52-54.

Tests on the influence of boron in a medium carbon resulfurized open-hearth steel indicate an increase in hardenability of 31%, and, as anticipated, an impairment of 5% or more in machinability.

- 3-34. New Titanium Steel for Vitreous Enameling. G. F. Comstock and E. Wainer. *Iron Age*, v. 155, Feb. 15, '45, pp. 60-63, 152-153.

By converting carbon in steel to a more stable form with heavy additions of titanium it does not react with oxides in enamel coatings to form gas and blisters. With certain precautions one-coat one-fire finishes are practicable.

- 3-35. Striking Improvements in Machinability Claimed for Leaded Steels. *Steel*, v. 116, Feb. 19, '45, pp. 136-139.

Machinability constants of leaded steel said to be 24 to 35% higher than non-leaded types with increases in feed from 36 to 60%. Phenomenal gains in tool life also held possible by this technique.

- 3-36. Stainless Steels, AISI Types 430 and 430F (Materials Work Sheet). *Machine Design*, v. 17, Feb. '45, pp. 175-178.

Properties; physical constants; characteristics; applications; fabrication; resistance to corrosion; galvanic corrosion annealing; data on stock forms; material trade names.

4. STRUCTURE

Metallography and Constitution

4-3. **Magnesium Alloy Metallography.** *Iron Age*, v. 155, Feb. 1, '45, pp. 58-59.

To facilitate the preparation of magnesium alloy specimens for metallographic study, the procedure described herein was developed by the Dow Chemical Co. Etchant formulas and a description of the microscopic appearance of the chief structural features of the commercial alloys are included as an aid to the inexperienced metallographer.

4-4. **The Orientation Texture at the Surface of Cast Metals.** Gerald Edmunds. *Metals Technology*, v. 12, Jan. '45, T. P. 1773, 1 p.

A zinc casting solidified against a molten lead surface was found to have the same surface orientation texture (001), parallel to the surface, as other zinc and cadmium castings. Aluminum and alpha-beta brass die castings were found to have random grain orientation textures at the surface.

4-5. **A Further Note on the Microstructure of High-Silicon Acid-Resisting Iron.** J. E. Hurst and R. V. Riley. *Iron and Steel Institute Advance Copy*, Dec. '44, 5 pp.

Silicon or its compounds, either in the etching reagent or in the specimen, are essential to the formation of the barley-shell structure and have to be taken into consideration in any explanation of its exact nature.

4-6. **Equilibrium Diagrams.** *Metal Industry*, v. 66, Jan. 26, '45, pp. 57-58.

Critical survey of the tools of research; Al-Zn system; Cu-Sn system. 3 ref.

4-7. **Metallographic Examination.** P. F. George. *Metal Industry*, v. 66, Feb. 2, '45, pp. 66-68.

Routine examination of magnesium alloys described in paper presented to the American Society for Testing Materials; includes the specimen preparation, etching technique, and a rating system for recording the microstructure as a series of numbers.

5. POWDER METALLURGY

5-6. **Symposium on Production and Design Limitations and Possibilities for Powder Metallurgy Parts.** *Metals Technology*, v. 12, Jan. '45, T. P. 1788, 96 pp.

Foreword, by F. N. Rhines. What Can Be Accomplished With the Metal Forms That Compete With Powder Metallurgy Parts? by Fred P. Peters. Machine Parts by Powder Metallurgy, by A. J. Langhammer. Pole Pieces for Electric Motors From Iron Powder, by F. V. Lenel. Bearings From Metal Powders, by W. R. Toeplitz. Brushes and Allied Powder Metallurgy Parts, by R. R. Hoffman. Electrical Contacts and Related Products, by E. I. Larsen. Sintered Magnets, by C. R. Fulton. Friction Articles From Metal Powders, by C. T. Cox. Certain Characteristics of Silver-Base Powder Metallurgical Products, by F. R. Hensel and E. I. Larsen. Some Properties of Sintered and Hot-Pressed Copper-Tin Compacts, by C. G. Goetzl. Studies Upon the Sintering of Metal Powders—Copper (Abstract), by C. J. Bier and J. F. O'Keefe. Some Experiments on the Effect of Pressure on Metal Powder Compacts, by Jerome F. Kuzmick. With discussion.

6. CORROSION

6-12. **Effects of Oxygen Exhaustion From Corrosive Solutions of High Nickel-Chromium-Molybdenum Alloy Steels.** W. E. Pratt. *Electrochemical Society Transactions*, v. 86, 1944 Reprint, 28 pp.

Procedures employed in discovering the causes of failures and the methods adopted for correcting the unusual corrosive conditions described. The information should prove helpful to both users and manufacturers of equipment made of such alloys.

6-13. **Cathodic Corrosion of Cable Sheaths.** Herman Halperin. *Electrochemical Society Preprint no. 87-1*, April '45, 14 pp.

Cathodic corrosion of cable sheaths has occurred with increasing frequency in an underground power cable system. Most troubles occurred where the conduits containing the cables are close to electric street railway track switches. Various methods have been used to retard the growing tendency for troubles due to cathodic corrosion. Also, special tests of potentials and leakage currents from a slug pulled through an idle duct were developed and used—in general with success—to detect underground locations having corrosive conditions, in order that steps could be taken to avoid service failures of cable. Further steps to reduce these troubles are (a) reduction of voltage drops on railway return systems and (b) development of an economical substitute for salt for use at track switches.

6-14. **Cathodic Protection of Steel Surfaces in Contact With Water.** Lee P. Sudrablin. *Water Works & Sewerage*, v. 92, Jan. '45, pp. 11-16.

Basic principles and controlling phenomena. 16 ref.

6-15. **Trans-Crystalline Corrosion Cracking of Boiler Preheater Tubes.** *VDI Zeitschrift*, v. 88, no. 17-18, April 29, '44, pp. 238-240.

An exhaustive investigation of trans-crystalline corrosion cracking of boiler preheater tubes produced from Siemens-Martin St. 35.29 steel was performed. The cause of such failures has been established as a chisel-action of oxide prying open the cracks.

6-16. **Silica Deposition in Steam Turbines.** F. G. Straub and H. A. Grabowski. *Combustion*, v. 16, Jan. '45, pp. 41-43.

Tests indicate that the silica leaves the boiler as vaporized silicic acid which later crystallizes on the blades in the lower pressure stages of the turbine. When the silica in the steam is below 0.1 ppm., no appreciable deposits are found in the turbines. Two methods of preventing deposits: (1) Maintain the silica in the boiler water below 5 ppm.; and (2) remove the silica from the steam by scrubbing with a pure grade water.

6-17. **Comparative Corrosion Resistance to Seawater of Low Alloy High Strength Steels.** J. F. T. Thomas and A. C. Halfordahl. *Canadian Chemistry and Process Industries*, v. 29, Jan. '45, pp. 43-46, 48.

Both laboratory and seawater tests are reported to show the beneficial effects of small amounts of copper, nickel, chromium or molybdenum.

6-18. **New Design of Humidity Cabinet for Corrosion Testing.** Floyd Todd. *Metal Finishing*, v. 43, Feb. '45, pp. 56-59.

Cabinet described was designed to give an accurate and reproducible comparison of the relative efficiencies of corrosion preventives which are to be used under indoor storage conditions, including intermediate protection in the process of manufacture. 8 ref.

6-19. **Cathodic Protection of Steel Surfaces in Contact with Water.** Lee P. Sudrablin. *Water Works & Sewerage*, v. 92, Feb. '45, pp. 51-57.

Comments on the practical application of the process. 17 ref.

7. CLEANING AND FINISHING

7-23. **Carbon Dioxide Extinguishing Systems Provide Safety in Degreasing.** *Steel*, v. 116, Jan. 29, '45, pp. 92, 94.

Units forming integral part of various automatic mass-production washing machines protect vital output.

7-24. **The Present Status of Electropolishing.** John S. Crout. *Metal Progress*, v. 47, Feb. '45, pp. 259-264.

Limitations; advantages; adherence of plate and enamel; economics.

7-25. **Lead-Alloy Coatings.** C. H. Hack, D. S. Kondrat and H. E. Zahn. *Metal Industry*, v. 66, Jan. 12, '45, pp. 18-19.

Wartime shortages in tin and zinc and a relative abundance of lead caused a quick conversion of many hot-dip operations to the use of a lead alloy much lower in tin than the conventionalterne plate coating. Results have been so satisfactory from a fabrication, performance, and cost standpoint, that a wide post-war use may be predicted. 3 ref.

7-26. **Cleaning of Magnesium Welds.** Norman H. Simpson and Kenneth E. Dorcas. *Aero Digest*, v. 48, Jan. 15, '45, pp. 107, 212.

Consolidated Vultee method of cleaning: Immerse in 5 to 10% caustic soda at 150° F. for 5 min., rinse thoroughly in cold water, immerse in 20% chromic acid at 150° F. for 2 min.; rinse thoroughly in cold running water; dry by air blast.

7-27. **Precision Finishing Procedures for Instrument Parts.** *Die Casting*, v. 3, Feb. '45, pp. 60-62.

Anodic treatment and the application of synthetic organic enamels are involved in the surface finishing required on die cast aircraft instrument parts manufactured in this Bendix plant.

7-28. **Radium Paint.** *Steel*, v. 116, Feb. 19, '45, pp. 120, 122, 125.

More industrial applications seen as price drops from \$5,000,000 to \$1,000,000 per ounce.

7-29. **Metallizing Non-Conductors.** Samuel Wein. *Metal Finishing*, v. 43, Feb. '45, pp. 61-63, 76.

Gold films; lead sulphide films; nickel films; anti-mony films; cathode sputtering; metal spraying. 51 ref.

7-30. **Quality Control of Enameling Steels.** R. F. Bisbee. *Steel*, v. 116, Feb. 26, '45, pp. 82-83, 118, 120, 122, 124, 126, 128.

Suppliers of steels graded quarterly to reduce trouble in processing and expedite production. Classifications arrived at by evaluating actual performance, receiving department tests and laboratory reports. Vitamin A plays part.

8. ELECTROPLATING

8-7. **Plated Plastics.** Stanley H. Brams. *Iron Age*, v. 155, Feb. 1, '45, pp. 62-65.

Plated plastics have some interesting postwar possibilities. Cost factors are usually higher than for plated metals, but there are some compensating advantages, including resistance to corrosion. Data on physical properties are included.

8-8. **Strip Plating Evaluation.** D. A. Swalheim. *Metal Industry*, v. 66, Jan. 5, '45, pp. 10-12.

Application of ordinary control methods to continuous electroplating baths is rendered difficult by the high operational speeds and high current densities employed; describes the development of a rotating cathode cell designed for this special purpose. (Presented to the Electrochemical Society.)

(Continued on Page 7)

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Ray T. Bayless.....Editor
M. R. Hyslop.....Managing Editor

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Compliments

To R. E. ZIMMERMAN, vice-president, U. S. Steel Corp., on his appointment to a committee of eight industrial executives to advise the Department of Commerce and the American Standards Association on future plans for standards work.

To the NEW JERSEY CHAPTER A.S.M. on its work in sponsoring the formation of the Technical Societies Council of New Jersey with S. SKOWRONSKI, chairman of the New Jersey Chapter, as chairman of the Council.

To ROBERT F. MEHL, head of the department of metallurgical engineering, Carnegie Institute of Technology, on the award of the James Douglas Gold Medal of the American Institute of Mining and Metallurgical Engineers for distinguished achievement in non-ferrous metallurgy.

To EDWIN CHESTER WRIGHT, assistant to the president, National Tube Co., on the award of the Robert W. Hunt Silver Medal of the A.I.M.E. for his paper on "The Manufacture and Properties of Killed Bessemer Steel".

To WILLIAM MARSH BALDWIN, JR., chief metallurgist, Euclid Case Plant, Chase Brass and Copper Co., Cleveland, on the Institute of Metals Division Award for his paper on "Effects of Rolling and Annealing Upon the Crystallography, Metallography and Physical Properties of Copper Strip".

To CARL GUSTAV HOGBERG, assistant to the chairman, Blast Furnace Committee, U. S. Steel Corp. of Delaware, on the J. E. Johnson, Jr., Award of the A.I.M.E. for his contributions to the science and art of smelting iron ores in the blast furnace.

To MARCUS A. GROSSMANN, director of research for Carnegie-Illinois Steel Corp., for the 1945 Howe Memorial Lecture of the American Institute of Mining and Metallurgical Engineers; to CHARLES SANBORN BARRETT, physicist, Metals Research Laboratory, Carnegie Institute of Technology, for the 1945 Institute of Metals Division Lecture of the A.I.M.E.

A. R. Stargardt Chief Metallurgist With Ajax Electric Co., Philadelphia

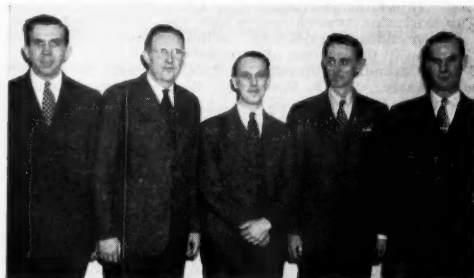
Ajax Electric Co., Philadelphia, announces the appointment of A. R. Stargardt as chief metallurgist. Mr. Stargardt's former affiliation was with Eastern Stainless Steel Corp., Baltimore, as chief metallurgist. In this capacity he provided consultation to many of the country's largest stainless steel fabricating firms. Prior to this time, he served as chief metallurgist for Gillette Safety Razor Co.

A member of the A.S.M., since 1920, he has served as an officer of the Baltimore Chapter and was a member of the War Products Advisory Committee.



Arthur Focke Speaks at Calumet Officers' Night

Reported by J. B. Segada
Metallurgist, Youngstown Sheet and Tube Co.



Arthur E. Focke (center), research metallurgist, Diamond Chain & Mfg. Co., and A.S.M. national trustee, was principal speaker at Calumet Chapter's Officers' Night. Left to right are P. H. Parker, Calumet Chapter inter-society chairman; A. T. Clarage, past national treasurer, who introduced the speaker; Dr. Focke; H. H. Feierabend, secretary-treasurer of the chapter; and J. A. Jones, vice-chairman and program chairman.

Arthur E. Focke, research metallurgist, Diamond Chain & Mfg. Co. of Indianapolis, Indiana, and A.S.M. trustee, was the principal speaker at the Calumet Chapter's "National Officers Night" meeting on Feb. 13. A. T. Clarage, president of Columbia Tool Steel Co. and a past national treasurer, was acting technical chairman for the evening and introduced Dr. Focke, who talked on "Tempering of Steel."

With the aid of slides, he presented three-dimensional diagrams that showed the comparative hardness values of plain carbon, high carbon alloy and tool steels obtained at various temperatures and times. He also elaborated on the Cohen method for making simultaneous dilation and intensity of magnetization tests. The talk aroused much interest and a lively discussion followed.

A talk on society affairs was presented by Mr. Clarage. In a coffee talk, W. Phelps, Quartermaster U. S. Navy, told of his experiences in Africa, Italy and Newfoundland. A large crowd attended in spite of the fact that a last minute change in meeting place was necessitated by the explosion and fire that recently destroyed Phil Smidts restaurant. The Executive Committee has been successful in booking the remaining meetings for this calendar year with Vogels restaurant.

Agitation of Quench Solves Heat Treating Failures

Reported by G. L. White, Editor
Canadian Metals and Metallurgical Industries

Interesting developments in the heat treatment of steel were discussed by R. B. Seger, works manager, Lindberg Steel Treating Co., Chicago, before the meeting of the Ontario Chapter on Jan. 5.

According to Mr. Seger, when failures occur in heat treatment there is a tendency to investigate every possible source of trouble except the quench. Actually the quench is frequently at fault and may usually be improved in its action by the employment of some system of agitation.

A typical problem of this type was encountered with a shear blade of chromium-tungsten steel which was expected to harden to Rockwell 58 or 59. The proper hardness was attained for a distance of about 1 in. from each edge of the blade but portions of the center were found with hardness of only Rockwell 33 to 42. It was discovered that these areas of low hardness resulted from vapor pockets which had an insulating effect and their occurrence was prevented by the use of a flush quench which resulted in a uniformly hard shear blade.

The next phase to receive attention was the refrigeration treatment of steel. Some interesting results have been obtained in the treatment of steels at temperatures of -80 to -120° F. Such treatment has proved of particular value in cases where growth occurs because of the transformation of the retained austenite to martensite. Sub-zero treatment completes the transformation rapidly, giving the part a more permanent structure not subject to growth.

A sub-zero treatment of steel will result in certain improvements but it will not work miracles and it is of greatest value on steels that are already of high quality. As with liquid nitriding, sub-zero treatment makes its greatest contribution when used on steels of high initial hardness. An interesting application of the stabilizing effect of sub-zero treatment has been in the production of gage blocks.

Other heat treating subjects discussed included induction treatment and austempering. The latter is not generally applicable to parts larger than 3/4 in. in cross-section and its greatest advantage is in the treatment of steels of high hardness where toughness and ductility may be achieved in combination with hardness.

Centrifugal Casting of Milling Cutters Rouses Much Interest in Ottawa

Reported by E. W. Marshall
Chief Inspector, Ottawa Car and Aircraft, Ltd.

"Centrifugal Casting and Kindred Arts in 20th Century Foundry Practice" was the subject presented by John Perkins, assistant foundry superintendent, Ford Motor Co., Detroit, before the Ottawa Valley Chapter on Feb. 6. The discussion period following his talk (which has been reported in a previous issue) was very instructive, particularly as it centered around the centrifugal casting of milling cutters and other fine cutting tools.

Likewise the item in the second portion of the talk, concerning the spinning of aircraft engine cylinder barrels, was of particular interest to several members since the reconditioning of the complete cylinder was done in an Ottawa plant under their supervision.

Fritsch Elected President of Tube Turns

R. E. Fritsch, vice-president of Tube Turns, Louisville, Ky., since 1929, has been elected president, succeeding Walter H. Girdler, Sr., who died on Jan. 7. He joined Mr. Girdler when Tube Turns was originally organized and he has had a major part in the firm's rapid growth.

Mr. Fritsch continues as vice-president and a member of the board of directors of the Girdler Corp., of which Tube Turns is an affiliate. He is a member of the American Society for Metals and the American Welding Society.



R. E. Fritsch

Strain Gage Techniques Lead Way to Redesign of Structures

Reported by R. E. Christin
Chief Metallurgist, Columbus Bolt Works Co.

Revolutionary ideas appear as the requirement as well as the trend for Columbus Chapter A.S.M. programs. Earlier in the season, lectures were given on "Quenching by Agitation and Turbulence," "Postwar Aviation," and "Plastics vs. Metals." On Jan. 9 came an old friend, Francis G. Tatnall, on "Electric Strain Gages", a revolutionary device with extremely widespread application.

Mr. Tatnall, who is manager of testing equipment, Southwark Division, Baldwin Locomotive Works, Philadelphia, covered the use of strain gages and stresscoat for experimental stress analysis, and the use of various new forms of fatigue testing machines for testing of structures and components and the evaluation of stress raisers. All of these furnish new tools for the efficient redesign of structures of all kinds, making structures stronger by making them lighter, and reducing the cost while making them more efficient.

The aeronautical industry has been a leader in this movement, but the technique is available in all engineering undertakings from automotive and railway equipment to machine tools, civil engineering structures, steam engines, turbines, ship structures, etc. Its application in aircraft, ordnance and marine work will become better known as war restrictions are removed.

The intriguing possibilities of combining metallurgy and design to improve the work of engineers, and the tools for making this readily accomplished, formed the basis of his talk.

J. O. Almen Speaks in St. Louis

Reported by S. N. Hunter
Metallurgist, Standard Steel Spring Co., Gear and Axle Division

J. O. Almen, mechanical engineer, General Motors Research Laboratories, was the speaker at a joint meeting of the St. Louis Chapter A.S.M. and the Engineers Club of St. Louis, the night of Feb. 1st.

Dr. Almen, in the course of his address, pointed out that the building up of compression stress by shot peening will materially increase fatigue resistance. Dr. Almen's talk has been reported in detail when presented before other chapters of the Society.

Metal Literature Review—Continued

8. ELECTROPLATING (Cont.)

8-9. **Copper Plating on Aluminum.** *Products Finishing*, v. 9, Feb. '45, p. 48.

Adherent, uniform copper plating is possible on aluminum and its alloys by means of a simple preparatory dip at room temperature. The dipping solution may be used in a steel, wood, or ceramic container, and, since no fumes are said to be given off, venting is not required. The solution has a long life, is stable, and not sensitive to drag-out, normal contamination, or dilution.

8-10. **Film in Chromium Electroplate.** J. B. Cohen. *Electrochemical Society Preprint* no. 86-28, Oct. '44, 14 pp.

Film-like network of a compound of chromium existed within the several electrochromium deposits which were examined. This network was associated with the usual crack system observed in chromium electroplates. The film isolated from a heated (482° C. for 2 hr.) chromium plate was investigated through spectrographic analyses, micro-chemical analyses, and X-ray diffraction studies and was found to consist of Cr_2O_3 and was about 0.05% by weight of the deposit. The "as-plated" compound is probably a hydrated chromium oxide.

8-11. **The Lead and Allied Plating of Bearings.** O. Wright. *Journal of Electrodepositors' Technical Society*, Reprint, v. 20, '45, pp. 1-16.

The requirements of bearings for internal combustion engines; lead plating bearings together with information on baths used; indium plating; inspection and control. 14 ref.

8-12. **Electro-Plating on Wire.** John Kronsbein and Alan Smart. *Journal of Electrodepositors' Technical Society*, Reprint, v. 20, '45, pp. 31-38.

Bimetallic wires; reasons for their adoption; methods of manufacture; hot-dipping; drawing; electroplating; original methods of wire plating; a recent design; detail construction; electrical control; plating current; tank heating; uncoiling and jointing; operation of the plant; output of the plant; heat treatment; strand annealing; batch annealing.

8-13. **An Investigation on the Silver Plating of Steel.** J. M. Sprague. *Journal of Electrodepositors' Technical Society*, Reprint, v. 20, '45, pp. 39-46.

Investigation to obtain silver plate, up to approximately 0.002 in. thick, on steel to specification D.T.D. 306 the coating being tested to withstand a temperature of 400° C. for a least one hour without blistering or apparent decrease in adhesion. Of interest where highly adherent silver plate is required for engineering purposes. 5 ref.

8-14. **Electroforming.** F. K. Savage. *Metal Industry*, v. 66, Jan. 19, '45, pp. 42-44.

Numerous industrial applications for electroforming have been made in spite of the lack of knowledge of this subject; describes the formation of trumpet bells by this method. (Presented to the American Electroplaters' Society.)

8-15. **Adhesion of Electrodeposits.** B. F. Lewis. *Monthly Review*, v. 32, Feb. '45, pp. 139-147.

Good adhesion throughout the service life of plated parts is promoted by the following factors: Surface of the basis metal must be free of loose smut or other foreign matter and must be finished by methods which remove, rather than form, a layer of cold-worked metal. This can be accomplished mechanically by buffing rather than polishing. Electrodeposition, once started, must not be interrupted until the total desired thickness of any given coating has been applied. Weather blistering may be minimized by observing the foregoing factors, plus thorough purification of plating baths, adequate thickness, and subsequent care and cleaning of the plated parts.

8-16. **Colorimetric Methods as Applied to the Analysis of Electroplating Baths.** D. Gardiner Foulke. *Monthly Review*, v. 32, Feb. '45, pp. 149-152.

Method for the determination of relatively small amounts of chromic acid in nickel and copper baths. Method described is the diphenylcarbazide method which is extremely sensitive as well as capable of giving results of high reproducibility. 3 ref.

8-17. **The Fundamentals of Chemistry for Electroplaters, XVI: Solutions and Solubility.** Samuel Glasstone. *Monthly Review*, v. 32, Feb. '45, pp. 155-158.

The nature of solutions; saturated solutions and solubility; purification by recrystallization; range of solubility; types of solution.

8-18. **A High pH Indium Cyanide Bath.** J. B. Mohler. *Metal Finishing*, v. 43, Feb. '45, pp. 60, 77.

Laboratory scale investigation. Preparation of baths described. 8 ref.

8-19. **High-speed Alkaline Tin Plating.** Martin M. Sternfels. *Metal Finishing*, v. 43, Feb. '45, pp. 52-55.

History; modern baths; potassium vs. sodium; the potassium stannate bath.

8-20. **Wire Plating.** J. Kronsbein and A. Smart. *Metal Industry*, v. 66, Feb. 2, '45, pp. 73-76.

Plant designed to electroplate wires up to about 16 s.w.g. described in paper presented to the Electrodepositors' Technical Society. In this plant the wire is positively driven throughout its length, and consequently the tension applied to it is limited to a low figure.

9. PHYSICAL & MECHANICAL TESTING

9-15. **Fatigue Tests at Resonant Speed.** R. E. Rawlins. *Metal Progress*, v. 47, Feb. '45, pp. 265-267.

Possibilities of resonant systems for setting up rapidly alternating stresses when called upon to test a new type of coupling. Object was to determine whether or not they would loosen under repeated reversals of a minor load.

9-16. **Stage for Hardness Surveys.** W. W. Sopher. *Metal Progress*, v. 47, Feb. '45, pp. 271-272.

Description of special anvil devised to take the place of the conventional type used on the Rockwell machine.

9-17. **Rockwell Hardness (Diamond Penetrator) of Cylindrical Specimens.** W. L. Fleischmann and R. S. Jenkins. *Metal Progress*, v. 47, Feb. '45, pp. 275-277.

Rockwell hardness measurement on a cylindrical surface is not the same as on the flat. To take Rockwell measurements on cylindrical surfaces it is necessary to establish a correction which would correlate the hardnesses taken on the two. Procedure outlined.

9-18. **New Machines for Creep and Creep-Rupture Tests.** M. J. Manjoine. *American Society of Mechanical Engineers, Transactions*, v. 67, Feb. 45, pp. 111-116.

Describes two new creep-rupture machines. To illustrate the satisfactory operation of these machines, the results of creep-to-rupture tests on a cast 25% Cr, 12% Ni alloy are presented. The data from these tests are summarized in "design curves" which serve to describe the behavior of a material at a given temperature. 7 ref.

9-19. **Fatigue Testing of Bearing Alloys.** P. G. Forrester and B. Chalmers. *Engineering*, v. 159, Jan. 19, '45, pp. 41-43.

Machines built for testing an important property of bearing alloys; the resistance to fatigue failure under various conditions. They are now being used to test a wide range of alloys. The results can not by themselves be considered to determine the liability of a bearing to fatigue failure under service conditions.

9-20. **Specifying Dynamic Balance, IV.** W. I. Senger. *Machine Design*, v. 17, Feb. '45, pp. 163-166, 196.

Establishes certain features which must be present in balancing equipment if it is to perform its function properly. Requirements.

10. ANALYSIS

10-8. **Hardness Test Separates Zinc From Cadmium Anodes.** A. A. Bradd. *Metal Progress*, v. 47, Feb. '45, p. 274.

Rapid and easy solution by hardness testing.

10-9. **Analysis of Aluminous Ore by Means of Spark Spectra.** J. Raynor Churchill and Raymond G. Russell. *Industrial & Engineering Chemistry (Analytical Ed.)*, v. 17, Jan. '45, pp. 24-27.

A rapid economical spectrographic method for the analysis of aluminous ore has been developed which meets the requirements of a routine method for grade sorting and preliminary testing of ores. Similar techniques have been found useful on a wide variety of metallic and non-metallic powders. 2 ref.

10-10. **Rapid Volumetric Method for Aluminum.** L. J. Snyder. *Industrial & Engineering Chemistry (Analytical Ed.)*, v. 17, Jan. '45, pp. 37-38.

A rapid and accurate procedure is described for the determination of aluminum in the presence of 1 to 10% of impurities such as calcium, copper, chromium, iron, magnesium, manganese, and zinc. Experimental data are presented showing the accuracy and the effects of impurities commonly associated with aluminum. Five to 10 minutes' time is required per analysis. 6 ref.

10-11. **Volumetric Determination of Calcium in Presence of Silica, Iron, Aluminum, Magnesium, Phosphorus, Titanium, and Manganese.** James J. Lingane. *Industrial & Engineering Chemistry (Analytical Ed.)*, v. 17, Jan. '45, pp. 39-41.

A volumetric oxalate-permanganate procedure is described which permits the direct determination of calcium in the presence of amounts of silica, iron, aluminum, magnesium, and phosphate, that are equal to or somewhat greater than the amount of calcium, and also in the presence of small amounts of titanium and manganese. The procedure employs only a single precipitation of calcium oxalate from acidic medium, duplicate determinations can be completed within two hours, and the accuracy compares very favorably with the more laborious classical methods which require the prior removal of most of the above elements. 4 ref.

10-12. **Analysis of Manganese Bronze.** Harold Ravner. *Industrial & Engineering Chemistry (Analytical Ed.)*, v. 17, Jan. '45, pp. 41-43.

A method is proposed whereby, with the use of a single sample weight, copper, lead, tin, iron, and nickel may be accurately determined in manganese bronze. Copper and lead are plated out in the presence of hydrofluoric acid which serves to hold tin in solution. Tin is subsequently separated from iron and nickel with hydrogen sulphide, reduced with lead, and titrated with potassium iodide-iodate solution. The hydrogen sulphide separation also serves to reduce iron to the ferrous condition, in which state it is determined by titration with ceric sulphate solution. Nickel is precipitated from the resultant solution with dimethylglyoxime. 6 ref.

10-13. **An Application of Spectrographic Methods to Chemical Concentrations of Trace Elements in Iron and Steel Analysis.** R. A. Wolfe and R. G. Fowler. *Journal of the Optical Society of America*, v. 35, Jan. '45, pp. 86-91.

Method is limited in speed and accuracy largely by the chemical techniques involved, but is more rapid than the chemical procedure, since it does not require individual separations of the elements. The accuracy reported is sufficiently good to be of use in many important research and control applications.

10-14. **Sulphur in Cast Iron.** Joshua T. Wilson and Josephine Bennett. *Foundry*, v. 73, Feb. '45, pp. 81, 218.

True evaluation of sulphur content in cast iron has been a problem for a number of years; simple direct procedure which is the composite of many now used.

10-15. **An Introduction to Metallurgical Spectrographic Analysis.** D. M. Smith. *Foundry Trade Journal*, v. 75, Jan. 18, '45, pp. 55-56.

Qualitative analysis; semi-quantitative analysis; accurate analysis with the microphotometer; effects of alloying constituents; preparation of electrodes; analytical accuracy; accuracy of spectrographic analysis. 3 ref.

10-16. **The Photometric Determination of Molybdenum in Metallurgical Products.** H. Cox and A. A. Pollitt. *Society of Chemical Industry Transactions*, v. 63, Dec. '44, pp. 375-378.

The conditions necessary for the production of a stable molybdenum thiocyanate color within a practicable limit of time have been investigated and a procedure is described which insures that the color is developed quickly and remains stable. The procedure gives accurate and reproducible results.

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Metal Literature Review—Continued

11. LABORATORY APPARATUS, INSTRUMENTS

11-9. **Beaded Glass Screen for Viewing Microstructures.** J. D. Walker and J. J. Takaca. *Metal Progress*, v. 47, Feb. '45, pp. 272-273.

Utilizes an 18 by 18-in. beaded glass screen as an attachment on the metallograph. Permits public examinations of the specimen in question.

11-10. **Identifying Specimen Mounts.** William Koppa. *Metal Progress*, v. 47, Feb. '45, p. 274.

Inexpensive and everlasting method for identifying metallurgical specimens mounted in transparent plastics. Procedure.

11-11. **Electrography Applied to the Examination of Electrodeposits.** H. D. Hughes. *Journal of Electrodeposits' Technical Society Reprint*, v. 20, '45, pp. 17-30.

Electrographic method of examining metallic surfaces derived from the contact print methods of determining the location of sulphides in steel and of checking the porosity of electrodeposited coats on steel. Advantages of the electrographic method. Apparatus; procedure; methods of application to the examination of electrodeposits; identification of deposits; examination of deposits for quality; electrographic analysis. 10 ref.

11-12. **Threaded Precision Gages Made to Exact Specifications.** *American Machinist*, v. 89, Jan. 4, '45, pp. 94-96.

Prewar experience aids Kobe in producing instruments for armed forces. Specialized measuring devices used to check accuracy.

11-13. **The Sonigage.** Wesley S. Erwin. *Aircraft Production*, v. 7, Feb. '45, pp. 63-64.

A supersonic contact instrument for thickness measurement.

12. INSPECTION AND STANDARDIZATION

12-16. **Improved Sensitivity in Double Exposure Radiography.** James Rigbey. *Canadian Metals & Metallurgical Industries*, v. 8, Jan. '45, pp. 20-23.

Preliminary work; experimental procedure. 5 ref.

12-17. **Spotting the Focal Spot.** Alfred C. Wooll. *Metal Progress*, v. 47, Feb. '45, p. 271.

Spotlight attached to the tube of X-ray unit, adjusted so that, at the usual tube-to-film distance, the light falls directly below the focal spot of the tube.

12-18. **Strain Gauging for Machine Tools.** Paul I. Smith. *Machinery* (London), v. 66, Jan. 4, '45, p. 7.

Static strength versus dynamic strength; principle of the method.

12-19. **Some Cases for Steel as a Material.** E. P. Strothman. *Steel Processing*, v. 31, Jan. '45, pp. 39-42, 48.

A few practical experiences on the selection of steel for materials and processes. (Presented at the Annual Meeting, Society of Automotive Engineers, New York, Jan. 10.)

12-20. **Recent Progress in Testing, Inspection and Control.** *Metals and Alloys*, v. 21, Jan. '45, pp. 134-140.

Opening review of general trends in the broad field of tests, standards and specifications, followed by brief surveys of recent developments in each of the important testing and control methods and fields.

12-21. **Comparative Surface Roughness of Highly Polished Flat Surfaces.** J. Kluge and G. Bochmann. *VDI Zeitschrift*, v. 88, no. 13-14, April 1, '44, pp. 179-181.

Special apparatus was developed to measure the reflectivity of polished surfaces.

12-22. **Efficient Acceptance (of Materials).** Karl Daeves. *VDI Zeitschrift*, v. 88, no. 15-16, April 15, '44, pp. 189-194.

The relation between actual stress and the ability to withstand stress represents only a presumptive value, determined generally by tests of short duration.

For acceptance of a new material its uniformity and utility in service are more important than the absolute strength value established by short duration test.

12-23. **Non-Ferrous Tube Defects.** W. L. Govier. *Metal Industry*, v. 66, Jan. 5, '45, pp. 2-4.

Causes and prevention of flaws during manufacture.

12-24. **Optical Inspection.** George C. Brown. *Production Engineering & Management*, v. 15, Feb. '45, pp. 87-90.

Benefits of lower costs of machining precision parts can only be realized through similarly improved economy and efficiency in inspection. Where applicable, the optical method of inspection provides rapid and accurate checking, yet requires low skill of operator.

12-25. **A Method of Statistical Quality Control Inspection of Light Alloy Castings.** F. A. Allen. *Foundry Trade Journal*, v. 75, Jan. 4, '45, pp. 3-6.

Adaptation of the method of the inspection of machined components. 3 ref.

12-26. **Interpreting Aircraft Casting Radiographs.** *Foundry*, v. 73, Feb. '45, pp. 82-85, 192, 194, 196, 198.

System for identifying radiographic images with metallurgical defects and methods for assessing acceptability of defective parts. (Given at the American Society for Metals' National Metal Congress.)

12-27. **Electronic Tools in Chemical Research.** Robert H. Osborn and Lewis W. Beck. *Electronic Industries*, v. 4, Feb. '45, pp. 82-85, 142, 148.

Instruments for qualitative and quantitative analysis, inspection, and control open new vistas in chemistry.

12-28. **Non-Ferrous Tube Defects.** W. L. Govier. *Metal Industry*, v. 66, Jan. 12, '45, pp. 23-25.

Defects which occur in the production of copper shells by rotary piercing and in the extrusion of copper-rich alloys.

12-29. **Replica Method for Evaluating Finish of a Metal Surface.** Harry K. Herschman. *Mechanical Engineering*, v. 67, Feb. '45, pp. 119-122.

A new method for evaluating surface roughness described which involves the use of rapidly produced plastic replicas of variable transparency. Evaluations of surface finish made by this method on five specimens which differed significantly in degrees of finish were correlated with profile values of these surfaces determined by (a) the profilometer method (as root-mean-square values), and (b) the microscope on cross-sections (peak-to-valley values). These data show that this replica method is especially sensitive for the evaluation of surfaces having high degrees of finish. 7 ref.

12-30. **New and Resharpener Taps Receive Laboratory Inspection.** *American Machinist*, v. 89, Feb. 15, '45, pp. 112-113.

Standard test pieces are used in determining acceptance or rejection of taps. Complete inspection records are kept. Elimination of faulty taps reduces scrap.

12-31. **Non-Ferrous Tube Defects.** W. L. Govier. *Metal Industry*, v. 66, Jan. 19, '45, pp. 34-36.

In the process of cold reduction of tubes, defects are confined to tool troubles, while the cold-drawing process reveals previously hidden defects in addition to those produced from the fouling of the tools.

12-32. **Inspection by Radiography.** T. W. Fassett. *Aircraft Production*, v. 7, Feb. '45, pp. 57-62.

Interesting technique developed for the examination of Lancaster tubular welded engine mountings.

12-33. **Non-Ferrous Tube Defects.** W. L. Govier. *Metal Industry*, v. 66, Jan. 26, '45, pp. 53-55.

Defects arising from annealing and pickling and the methods of detection of defects in finished tubes; stresses the importance of good planning and organization if a sound product is to be produced.

12-34. **A Simplified Approach to Quality Control.** George O. Cutter. *Iron Age*, v. 155, Feb. 15, '45, pp. 70-74.

Provides a simple working plan for both acceptance control and process control inspection for those people who have decided that quality control might be worth a try in their own plant or shop.

12-35. **Laminations in Welded Steel Plates.** Fred L. Goldsby. *Iron Age*, v. 155, Feb. 15, '45, pp. 66-69.

Chemical segregations, usually not serious, should not be confused with laminations, which are of two types, only one of which is dangerous. The author's analysis of the occurrence and detection of laminations should put fabricators' and purchasers' minds at ease to some extent. Experience at one of the largest elevated tank fabricators indicates that plate rejections due to laminations amount to about 1/4% of all steel plate used.

12-36. **Industrial X-Ray Exposures Timed Automatically.** *Iron Age*, v. 155, Feb. 15, '45, p. 69.

Timer operates on the principle of the light exposure meter which amateur photographers use. X-ray radiation, passing through an object, strikes the fluorescent screen. A section of the luminous screen is scanned by a photoelectric tube which in effect measures the light leaving the screen. When enough light has left the screen for the desired film exposure, the photoelectric timer actuates a relay, opening the X-ray circuit and terminating the exposure.

12-37. **X-Raying Developments.** John L. Bach. *Modern Metals*, v. 1, Feb. '45, pp. 24-26.

Significant developments concerning X-raying which are speeding production and insuring quality throughout our war industries. X-ray inspection is particularly important in advancing foundry and fabrication procedures.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-4. **Pen Cleaners for All (Who Have Hair).** A. L. Hodge. *Metal Progress*, v. 47, Feb. '45, p. 273.

Hair plucked from a human's head works for pen cleaning or priming wire when a recording pen actually fails to write.

13-5. **Heat Transfer.** G. W. Penney. *Scientific American*, v. 172, Feb. '45, pp. 101-102, 104.

Some of the fundamental science surrounding the many ways in which heat transfer is involved in the machinery of modern industry. Five different basic mechanisms for transferring heat. Many large companies maintain basic research on these problems because of their importance.

13-6. **A.S.M.E. Heat Transfer Division.** *Mechanical Engineering*, v. 67, Feb. '45, pp. 130-133.

Development, objectives, and operation.

14. FOUNDRY PRACTICE AND APPLIANCES

14-49. **Casting Supercharger Buckets at Allis Chalmers.** G. W. Birdsall. *Steel*, v. 116, Jan. 29, '45, pp. 72-75, 96, 99-100.

Significant wartime development is perfection of the "lost wax" or investment method of precision casting and its application to the production of buckets for aircraft engine turbosuperchargers. Important postwar uses are foreseen because of ability to cast parts of intricate design to dimensional tolerances of 0.001 in. or less and with such smooth surfaces as to require little or no finishing. Said to do for high melting point metals and alloys what die casting does for materials in the lower melting point ranges.

14-50. **Centrifugal Steel Castings.** L. Northcott and D. McLean. *Metal Progress*, v. 47, Feb. '45, pp. 277, 328.

Centrifugal castings of tubular shape 6 1/2 in. diameter and about 1 1/4 in. wall thickness were made of a nickel-chromium-molybdenum steel. Rotating mold had its axis horizontal and the speed ranged, for different casts, from 450 to 1700 r.p.m. Castings were cut transversely at mid-length and three distinct types of structures observed, of the same fundamental nature as those found in similar non-ferrous castings. (Abstract of paper for Iron & Steel Institute.)

14-51. **Improvements in Static Ferrous Castings Influencing Their Future Use.** G. Vennerholm. *S.A.E. Journal*, v. 53, Feb. '45, pp. 103-109.

Developments and improvements relative to static ferrous castings, along with an analysis of the influence they may have on future design and manufacturing methods of the automotive, aircraft, and related industries. New steels and molding materials have been introduced, as well as improvements in melting, molding, and heat treat techniques, better methods of inspection, and greater uniformity of product.

14-52. **Refractory Molds for Precision Casting.** Jules W. Glaser. *Iron Age*, v. 155, Feb. 8, '45, pp. 52-57.

The refractory mold as the critical feature in the process; data on the binder used for high temperature investments.

(Continued on Page 10)



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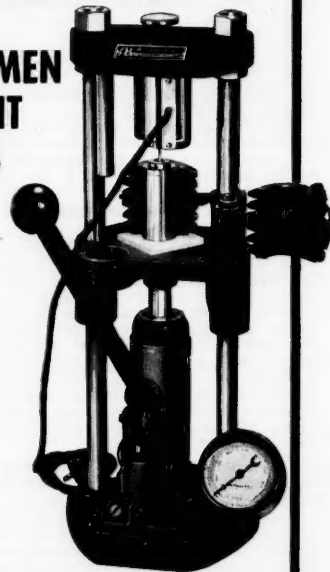
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FERROUS METALLURGIST: Middle west research institute. Salary open. Box 3-10.

INDUSTRIAL FURNACE DESIGNER: Experienced; permanent position with industrial furnace company. Knowledge of mechanical handling and quenching equipment of particular value. Ideal working conditions; generous pension plan; opportunity and salary commensurate with ability. Submit all details of education, experience, salary and photograph in first letter. Ajax Electric Co., Inc., Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

METALLURGIST: New York precious metals firm requires man for research and development laboratory. Knowledge of powder metallurgy or brazing metallurgy preferred. This is a key position with an excellent future in a medium size well established company. All replies held in strictest confidence. Please state full details of background. Box 3-15.

TOOL STEEL SALESMAN: For old established steel firm. Operate company car in New York area. State qualifications and salary expected. Permanent position to right person. Box 3-45.

HIGH SPEED STEEL HARDENER: To take charge of newly installed salt bath equipment in a midwestern plant. Will work directly under chief metallurgist and must be completely familiar with all phases of salt bath operation and maintenance; also spark testing and straightening work on high speed steels. Excellent opportunity to build and head a new department. Excellent wages and working conditions. Box 3-50.

ARE YOU THE MAN? We honestly believe this job presents more than an ordinary opportunity for a young engineer with real enthusiasm. It's not an easy job—few good jobs are. It pays a reasonable salary to begin with—and from then on it's up to the man. We call it a technical sales job. It requires some knowledge of chemical and metallurgical engineering, but real selling enthusiasm and a genuine desire to do things are really more important. Tell us all about yourself in your letter—age, draft status, experience and salary requirements. Box 3-55.

METALLURGISTS are needed in the Bureau of Mines, in Naval Shore Establishments and in War Department Arsenals. Salaries range from \$2,433 to \$6,228. Announcements and application forms may be secured from nearest first or second class post office or from U. S. Civil Service Commission, Washington 25, D. C.

METALLURGIST: With a number of years plant experience on non-ferrous metallurgy to work in plant producing magnesium castings. Some X-ray experience would be preferable. The plant is an Ohio manufacturing concern. Box 3-60.

Positions Wanted

PYROMETER MAN: Eighteen years' experience, installing, servicing, and repairing. Capable of taking charge of large pyrometer department. Familiar with practically all phases of heat treating; 3½ years of metallurgical training. Box 3-20.

METALLURGICAL ENGINEER: Young, ambitious, excellent metallurgical background. Ten years' experience in research and production laboratory of well known manufacturer. Familiar with welding, heat treatment and fabrication techniques. Five years research on special melting methods. Desires permanent position with wide-awake organization. Classified 2-B. Release obtainable. Box 3-25.

PHYSICAL METALLURGIST-CHEMIST: Heat treating methods, control heat treating department, plain and alloy steels; magnaflux; direction of metallurgical, metallographic and chemical laboratory; some experience in brass and zinc coated wire; dies, precision centrifugal steel casting; austempering. Reads several continental languages. Executive ability; above draft age. Box 3-55.

METALLURGICAL ENGINEER: Graduate with ten years' technical experience in ferrous and non-ferrous metallurgy, control, development, and research. Five years as chief metallurgist and supervision in control and development laboratory. Experienced in personnel training, failure analysis, and trouble shooting. Familiar with fatigue, creep, austempering, and tool and alloy steels. Minimum salary \$4,800. Box 3-30.

INDUSTRIAL ENGINEER: Age 31; desires position with progressive organization in southwestern part of U. S. Capable and experienced in management responsibilities. Engineering, design, production, costs, estimating, personnel, etc. Background in metallurgy and heat treatment of ferrous and non-ferrous materials, and manufacture and processing of ingot steel and steel castings; aircraft engine design and parts fabrication. Box 3-35.

METALLURGICAL ENGINEER: Seven years experience; M.S. in Met. Eng. Presently responsible for cupola control and research studies on cupola operation for large company operating gray iron foundries. Experience in steel manufacture and inorganic analyses. Available interview New York area; free to move. Desires foundry operation, research, or sales engineer. Minimum salary \$400. Box 3-40.

ENGINEER: Energetic, 20 years experimental engineering experience, the last 13 years in highly competitive automobile and accessory plants. Knows sound design and its application to modern shop practices. Would welcome contact with a growing organization which can offer opportunity commensurate with ability and effort. Box 3-65.

Powder Metallurgy Cuts War Job From 2500 Men to 68

Reported by R. Wayne Parcel

Metallurgist, Denver, Rio Grande & Western Railroad Co.

Ability to get into production very quickly was one of the outstanding advantages of "Powder Metallurgy" cited by A. J. Langhammer, president of the Chrysler Corp., Amplex Division, when he addressed the Rocky Mountain Chapter of the A.S.M. on Jan. 19 in Denver, and on the preceding evening in Pueblo. Mr. Langhammer discussed at considerable length both Oilite self-lubricating bearings and Oilite machine parts.

Elimination of time-consuming operations such as surface contouring and the hand finishing of square, blind holes is another factor in speeding up production. As an example, the speaker pointed out one war job where conventional methods would have required 2500 men for a year, whereas the job was done with 68 men in three months. He stated that a properly equipped plant can tool up in a week even for a somewhat difficult job, provided, of course, that the product is amenable to this method of production.

Mr. Langhammer went briefly through the steps in the manufacturing process, starting with the powders (which are purchased to a rigid specification for size, shape, and purity), then describing the machinery used for pressing, sintering and sizing operations. In a simple cylinder, for example, the die holds a column of powder three times as high as the length of the finished bearing, yet even after compressing the product contains 30% voids by volume. The physical properties of the finished product are, theoretically, roughly 70% of those of a solid of identical dimensions and material.

In spite of this reduction in tensile strength due to these voids, the sintered piece usually outperforms the solid one. The reason is thought to be that the oil in the voids acts as a hydraulic cushion, and resists impact. Pressure, or heat, brings forth a continuous oil film. Thus, a sharp blow such as would cause brinelling in a normal bearing seems to have no such effect upon powdered bearings, because, it is reasoned, the oil film is increased, rather than destroyed by the flow.

In answering questions from the audience, the speaker revealed that sintered products can be made in sizes ranging from 1/32 to 36 in. in diameter, and capable of carrying static loads from 8000 to 150,000 psi. The oil used is inhibited against oxidation at normal operating temperatures, and does not gum.

Cored and bar stock is manufactured, from which the purchaser can make his own bearings, particularly for maintenance and development work. A very, very sharp carbide-tipped tool is recommended for finishing. The sintered metals can be welded, soldered, or brazed, provided they are chemically clean.

Sauveur Lectures to Chronicle Evolution of Physical Metallurgy

(Continued from page 1)

The following excerpts are presented from a report of the Boston Sauveur Memorial Night Speakers Committee:

The Boston Chapter established a "Sauveur Memorial Night" soon after the death of the distinguished metallurgist who had long been an active participant in its affairs. It was stipulated that the speaker for the evening would be selected from among those who had studied under him. The "Sauveur Nights" were successful and brought to the Boston audience many distinguished speakers including such men as Jeffries, Mehl, Grossmann, Winlock, Krivobok.

Because of the interest shown in the lectures, the desire to perpetuate the series, and the realization that to do so would require a broader base for the selection of speakers, the Boston Chapter has this year set up new regulations governing the selection of the Sauveur Night Speaker. The rules for the selection of the speaker include provisions that:

1. The subject shall be in the domain of physical metallurgy.

2. It shall be in a field considered to be in a state of most active development at the time of selection of the speaker and of greatest current interest.

3. It shall present latest achievements in the field.

4. The speaker shall be selected as one best qualified and shall be identified with active development in the field.

The speaker is to be selected one year in advance. It is anticipated that the presentations will be published in one of the A.S.M. magazines and critical comment invited. A present thought is that the Boston Sauveur Memorial Lectures together with written comments will be collected periodically into volumes.

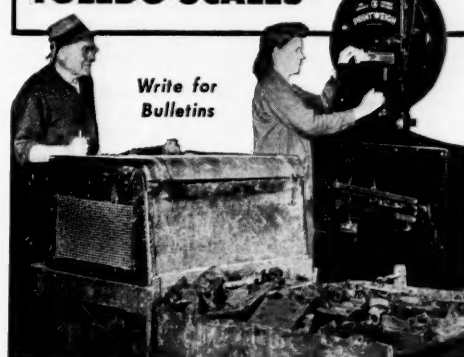
The concept of this lecture series is believed to be important. If speaker selections are carried out in accordance with the spirit of the original intention, American metallurgy will be presented annually with summarizations of recorded achievement in currently active developments in physical metallurgy. The succeeding volumes of the Boston Sauveur Memorial Lectures will chronicle the evolution of physical metallurgy.

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A.S.M. Review of Current Metal Literature—Continued

14. FOUNDRY PRACTICE (Cont.)

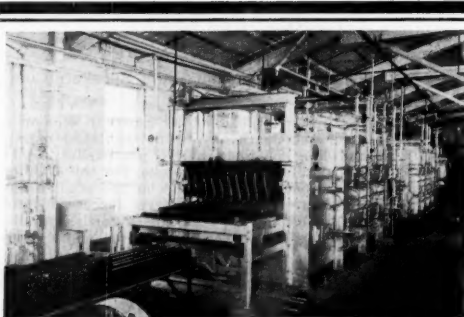
- 14-53. Casts Miles of Steel Chain. Pat Dwyer. *Foundry*, v. 73, Feb. '45, pp. 74-77, 220, 222.
New method and equipment for casting steel chains in the foundry.
- 14-54. Foundry Progress in 1944. *Foundry*, v. 73, Feb. '45, pp. 78-79, 178.
Principal developments during 1944 in foundry processes and products are cited by industry authorities, as taken from a general review of the metal working industries as presented in the Jan. 3 issue of *Steel*. Gray Iron Industry Improves Product Quality by Better Control, by R. G. McElwee; Water Quenching of Steel Castings Extended to Many Types, by Charles W. Briggs; Non-Ferrous Foundries Making Greater Use of Mechanical Processes, by Harold J. Roast; Continuous Melting Aids Production of Malleable Iron Castings, by James H. Lansing.
- 14-55. Permanent Mold Castings. John Vickers. *Foundry*, v. 73, Feb. '45, pp. 86-87, 200, 202, 204.
Advantages of permanent mold casting: Smoother finish and closer dimensional accuracy; greater possible speed of production; conservation of raw material; reduction of production scrap; improved mechanical properties in the casting.
- 14-56. Malleable Castings for Heavy Duty Trucks. Pat Dwyer. *Foundry*, v. 73, Feb. '45, pp. 90-93, 224.
Malleable iron foundry recently erected and placed in operation by Saginaw Malleable Iron Division, General Motors Corp., at Tilton, Ill. Molding machines mounted in pits; metal superheated in electric furnace.
- 14-57. The Production and Founding of Inoculated High-Duty Cast Iron. J. L. Francis. *Foundry Trade Journal*, v. 75, Jan. 4, '45, pp. 7-10.
Cooperation of the designing, pattern-making, founding, and metallurgical departments.
- 14-58. Magnesium Inhibitors and Their Relationship to Core Practice. G. H. Curtis. *Light Metal Age*, v. 3, Jan. '45, pp. 16-21, 39-40, 46.
Discusses present practices with the volatile inhibitors and aims to advance a modified technique for foundry practice with a potassium fluoborate, and the properties of this inhibitor are compared with various other fluorides. 2 ref.
- 14-59. Precision Casting. R. Neiman. *Metal Industry*, v. 66, Jan. 5, '45, pp. 5-7.
Adaptation of investment process in commercial work; review of materials, methods and machines for the production of armament parts by the "lost wax" process. (Presented at the Third War Production Foundry Congress, American Foundrymen's Association.)
- 14-60. The Use of the Blast Furnace Slag as a Core Sand. Adolf Fisher. *Die Giesserei*, v. 31, Jan., '44, pp. 5-7.
For evaluating the possibility of using the blast furnace slag as a core sand, the chemical and physical properties of slag granulated in cold water (including the grain sizes and their type) were determined. The granulated slag was coarser than regular sands. Some very large iron castings are regularly cored with slag-sand.
- 14-61. Precision Casting. R. Neimen. *Metal Industry*, v. 66, Jan. 12, '45, pp. 20-22.
Consideration is given in this installment to the shrinkage factor of investments, to the alloys which have been cast successfully by the precision casting process and to the production of patterns.
- 14-62. Practical Application and Theory of Gating and Riser Practices in Molding Non-Ferrous Castings. A. C. Boak. *American Foundryman*, v. 7, Feb. '45, pp. 11-13.
Fundamentals of correct gating and risering so that they may be applied when casting alloys of copper, tin, lead and zinc which naturally are prone to shrinkage. (*Canadian Metals & Metallurgy*, Nov. '44.)
- 14-63. Precision Casting. R. Neimen. *Metal Industry*, v. 66, Jan. 19, '45, pp. 39-41.
Descriptions of the production of the metal die, of the mixing of the investment and of the burning out of the mold form. Two types of precision casting machines are described.
- 14-64. The Production of Builders' Castings. Charles Gillespie. *Foundry Trade Journal*, v. 75, Jan. 25, '45, pp. 65-68.
Repetition foundry and postwar demands.
- 14-65. Methods and Problems Indigenous to a General Engineering Iron-Foundry. William Montgomery and John Doig. *Foundry Trade Journal*, v. 75, Jan. 25, '45, pp. 71-74.
Jobbing shop as a training ground for molders.
- 14-66. Precision Casting. R. Neiman. *Metal Industry*, v. 66, Jan. 26, '45, pp. 59-60.
Concluding review of the precision casting process; deals with the fields of application for the process and with the importance of efficient laboratory control.

15. SALVAGE AND SECONDARY METALS

- 15-3. Testing Brass Turnings for Silicon Contamination. M. R. Berke. *Metal Progress*, v. 47, Feb. '45, p. 272.
Method to determine whether red brass or tin-bronze turnings, purchased for remelting into alloy ingots, are contaminated by silicon-bronze turnings.
- 15-4. The Reclamation of Swarf. *Machinery* (London), v. 66, Jan. 18, '45, pp. 57-60.
By careful separation and selection, several thousand tons of aluminum scrap are made available to the aircraft industry.
- 15-5. Salvaging High-Speed Steel Scrap. Eric Simons. *Steel*, v. 116, Feb. 19, '45, pp. 140, 166.
Shortages of materials and tools in England re-emphasize importance of conservation and reclamation. Greater care in use of high-speed steel, diminution of sizes and use of valuable scrap as inserts brazed to mild steel pads and for teeth in slotting side and face cutters are found effective.

16. FURNACES AND FUELS

- 16-12. Cokes Utah Coal in Pacific Coast By-Product. Ovens. G. Eldridge Stedman. *Steel*, v. 116, Jan. 29, '45, pp. 84, 86, 88, 91.
Low-temperature char, petroleum coke and tamping of coal charge in oven are under investigation as a means toward effecting further economies. Ovens are operated on 18-hr. coking time. Full line of by-products recovered in modern equipped plant.
- 16-13. Miniature Smelting. *Iron Age*, v. 155, Feb. 1, '45 p. 57.
One-eighth scale working model described.
- 16-14. New Research Data Concerning the Ash Deposits on Heated Boiler Surfaces. Arthur Zinza. *VDI Zeitschrift*, v. 88, no. 13-14, April 1, '44, pp. 171-178.
When high ash fuels were used in a large boiler installation, an extensive ash accumulation was discovered on the heated surfaces. Such accumulation could not be avoided by the modification of combustion chambers. This fact induced the investigation of ash constituents and led to the plotting of phase diagrams for ash between CaSO₄ and the other ash constituents. Further research on the basis of such diagrams may possibly indicate a remedy.
- 16-15. Modern Blast Furnace Design and Operation. James Dale. *Blast Furnace & Steel Plant*, v. 33, Feb. '45, pp. 232-236, 278.
Distribution of the raw materials in the blast furnace. (Abstract of paper read before the West of Scotland Iron & Steel Institute.)
- 16-16. Use of Power for Fast Melting. N. J. Roberts. *Blast Furnace & Steel Plant*, v. 33, Feb. '45, pp. 237-240.
Characteristics of the electrical circuit of the arc furnace discussed by metallurgists and others who are responsible for the actual production of steel in the electric furnace. (Presented at the Electric Furnace Steel Committee, American Institute of Mining & Metallurgical Engineers, Oct. 5-6, 1944.)
- 16-17. Tray Improvements Brought About by Wartime Use of Pusher Furnaces. Joseph Sammon. *American Machinist*, v. 89, Jan. 4, '45, pp. 90-93.
Better quality of heat-treated work and a programmed method of work loading are advantages of trays and tray fixtures designed specifically for the conditions in a given plant.
- 16-18. Developments in Heating in 1944. *Steel Precessing*, v. 31, Jan. '45, pp. 47-48.
Roller hearth furnaces; infra-red ovens; elevator furnaces; small heating units; electronic heaters.
- 16-19. Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces. Wallace G. Imhoff. *Industrial Gas*, v. 23, Jan. '45, pp. 16-17, 29-31.
Galvanizing furnaces, gas-fired.
- 16-20. Fixtures Extend Usefulness of Trays for Pusher Furnaces. Joseph Sammon. *American Machinist*, v. 89, Feb. 1, '45, pp. 92-93.
When a change takes place in a product, 90% of the trays on hand can be kept in service by purchasing new tray fixtures.
- 16-21. Prevention of Sludge Deposits. R. W. Mitchell. *Steel*, v. 116, Feb. 12, '45, pp. 106, 152.
In fuel oil storage tanks use of dispersing agents permits more efficient furnace operation.
- 16-22. Recent Applications in Radiant Gas Heating. A. L. Roberts. *Industrial Gas*, v. 23, Feb. '45, pp. 22, 35-36.
How radiation and convection differ; principles of infra-red process; possibilities of selective absorption.
- 16-23. The Performance of Larger Hot Blast Stoves. B. B. Frost. *Iron and Steel Engineer*, v. 22, Feb. '45, pp. 64-69, 79.
Blast heating ability is determined by the heat storage and transfer capacity of one stove and not by the total of the group; for normal basic iron production, two properly designed stoves in continuous operation will insure reasonable blast temperature.



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- 16-24. New Open-Hearth Furnaces at Homestead. H. J. Pugsley. *Iron and Steel Engineers*, v. 22, Feb. '45, pp. 89-97.

This modern plant includes the latest features designed to aid in efficient operation; more than a year of operating experience has borne out the forethought put into the planning.

- 16-25. Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces. Part XXV. Wallace G. Imhoff. *Industrial Gas*, v. 23, Feb. '45, pp. 18-19, 33-35.
- 16-26. Physical Control Methods in the Steel Industry. W. Barr and T. F. Pearson. *Journal of Scientific Instruments*, v. 22, Jan. '45, pp. 1-5.

Describes some of the methods of control (involving physical principles) which are common to a large steel works, to indicate their significance and some of the difficulties still outstanding. 7 ref.

17. REFRACTORIES AND FURNACE MATERIALS

- 17-11. Construction and Maintenance of Arc Furnace Lining. N. F. Duffy. *Steel*, v. 116, Feb. 5, '45, pp. 118-119, 134, 136.
Shapes should be kept to minimum number. Support of electrode coolers requires careful consideration to avoid cumulative trouble. High-power modern furnaces have created a demand for brick capable of standing up under high voltages and intense arcs. Metal case magnesite recommended for sidewall lining. Dolomite employed to reduce consumption of chromite and magnesite.
- 17-12. The Steel Industry Talks About Refractories. Brick & Clay Record, v. 106, Feb. '45, pp. 43-45.
Most steel men expect little peacetime decrease in refractories use. Few wartime failures have been noted. Greatest demand is for more uniformity.
- 17-13. Construction and Maintenance of Arc Furnace Lining. N. F. Duffy. *Steel*, v. 116, Feb. 12, '45, pp. 114, 154, 157, 158, 160, 162-164.
Dolomite, when carefully graded and fully rammed, affords high packing density in hearth construction. Various steps involved in burning-in operation are presented. Five causes of hearth troubles described in detail and remedies suggested. Choice of brick summarized.
- 17-14. Completes Test Run on Mullite Open Hearth Roof. C. W. Fyfe. *Steel*, v. 116, Feb. 19, '45, pp. 128, 164.
Construction employed for laying up furnace roof of this type refractory at an Ohio shop results in pinching and eventually spalling from the knuckle to the end-wall. Since installation of new center section little or no erosion has occurred. Future plans call for fully suspended center section from knuckle to knuckle. Mullite is used in many types of furnaces in the steel industry.

18. HEAT TREATMENT

- 18-29. Heat Treating Fasteners. *Steel*, v. 116, Jan. 29, '45, pp. 76-77, 104, 106, 108.
National Screw & Mfg. Co. uses continuous chain-belt electric and other types of furnaces in imparting desired physical characteristics to some 15,000 standard and 25,000 special types of bolts, cap screws, other fastening devices. Automatic temperature controls minimize individual attention to each furnace.
- 18-30. Induction Heating. *Steel*, v. 116, Jan. 29, '45, pp. 81-82, 118, 120.
Hearing before Federal Communications Commission reveals phenomenal advances.
- 18-31. Queen City Steel Treating Company Performs Wide Diversity of Treatments. E. P. Stenger. *Steel Processing*, v. 31, Jan. '45, pp. 21-25.
Company is equipped and staffed to handle all the usual heat treating operations; furnace hardening either in open furnaces or in controlled atmospheres; annealing; normalizing; stress relieving; induction hardening and brazing; flame hardening; cyaniding; liquid, pack, and gas carburizing; austempering; lead pot hardening and drawing; high speed steel salt bath hardening and furnace brazing.
- 18-32. Surface Hardening and Brazing with the Induction Heater. Gilbert C. Close. *Steel Processing*, v. 31, Jan. '45, pp. 43-46.
Inherent characteristics of the induction process give rise to a degree of product uniformity and quality control hitherto impossible to attain; advantages of heat control; cost comparison; brazing; coil design.
- 18-33. Start Exploring Jominy Bar on Soft End. Gerrit DeVries. *Metal Progress*, v. 47, Feb. '45, p. 271.
Making the first measurements at the soft end of the Jominy bar where, if the measurement is low, the hardenability estimate is not unduly affected.
- 18-34. Stamp for Marking Jominy Test Bar. Howard B. Myers. *Metal Progress*, v. 47, Feb. '45, p. 273.
Rubber stamp to place ink lines 1/16 in. apart on the hardened Jominy specimen.
- 18-35. Copper Plate as a Stop-Off When Nitriding. W. V. Sternberger and E. R. Fahy. *Metal Progress*, v. 47, Feb. '45, pp. 278-279.
Various coatings used in the past for selective "stopping-off" against nitriding. Copper, deposited under controlled conditions to give a dense non-porous plate, is effective. Describes the tests made and gives a summary of other methods commonly used.
- 18-36. Magnetic Measurement of the Hardenability of Carbon Toolsteels. C. B. Post. *Metal Progress*, v. 47, Feb. '45, pp. 286-288.
Cone-shaped test piece for determining the hardenability of carbon toolsteels is reliable and has sufficient sensitivity for the testing of shallow hardenabilities.
- 18-37. Refrigeration of Aluminum Alloys. *Refrigerating Engineering*, v. 49, Feb. '45, Insert after page 148.
Heat treatable aluminum alloys; delaying age hardening; temperatures for delaying age hardening.

(Continued on Page 12)

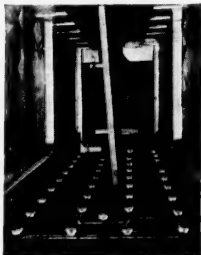
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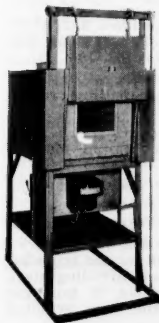


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**Modulus Important in
Designing for Cast Iron**

Reported by A. H. Rauch
Deere & Co.

A. W. Demmler, director of metallurgy and research, Campbell, Wyant, and Cannon Foundry Co., addressed a joint gathering of the Tri-City Chapter, A.S.M., and the Quad-City Chapter of the American Foundrymen's Association Jan. 9 on the subject "Inherent Characteristics of Iron and Steel".

Concerning heat treated gray iron, Mr. Demmler pointed out that although a cast iron may be martensitic, its damping capacity is still greater than that of steel because of the presence of graphite flakes.

The importance of keeping in mind the modulus of elasticity in designing was emphasized. Although the modulus of steel is for all practical purposes, a constant, the modulus of elasticity of cast iron may vary considerably, the higher strength iron having in general the higher modulus.

The effect of stress concentration due to sharp notches, tool marks, etc., on shock properties and endurance limit was illustrated by slides. Mr. Demmler maintained that the filing out of a nick until it is no longer visible may not fully remove its stress raising effect.

The use of inoculants in gray cast iron serves to decrease chill, and increase tensile strength without necessarily affecting base hardness. Inoculants are most effective in the lower carbon equivalent irons. The effect of inoculants was in part attributed to their strong deoxidizing capacity. Holding time after adding inoculants is very important, since excessive holding times cause the inoculant to spend itself. Inoculants are added in excess to compensate for variation in holding time.

Mr. Demmler commented on the effect of intensifiers in steel on heat treatment, physical properties, and machinability.

**Krivobok, LaQue Set up Chemical Lab
To Demonstrate Corrosion in Action**

Reported by J. L. Petz
International Business Machines Corp.

V. N. Krivobok and Frank LaQue, at a joint meeting of the Rochester Chapter of the American Society for Metals and the Superintendents and Production Managers Group of the Industrial Management Council, discussed and then demonstrated at length "Corrosion in Action" before a large group at the Rochester Chamber of Commerce on Feb. 12.

A well-equipped chemical laboratory with spot lights, electrical testing and measuring instruments, and projecting equipment was set up on the speakers' platform. Mr. LaQue proceeded to demonstrate before the audience various corrosion processes as explained beforehand by Dr. Krivobok, from a "simple plating reaction of copper on steel out of a copper sulphate solution" to measuring galvanic and concentration cell corrosion electrically on a millivoltmeter and a milliammeter.

So interesting was the lecture given by this team of experts, and the question and answer period following, that many members remained to question the speakers privately. Much credit for this meeting should be given Mr. Wedel of Eastman Kodak Co. for not only obtaining these guest speakers but for securing the laboratory equipment so generously loaned by Eastman Kodak Co., the Bausch & Lomb Optical Co., and the Weston Electrical Instrument Co.

**Judgment of Molder Is Important
Factor in Modern Foundry Practice**

Reported by F. G. Wayman
Chemist, The Steel Co. of Canada, Ltd.

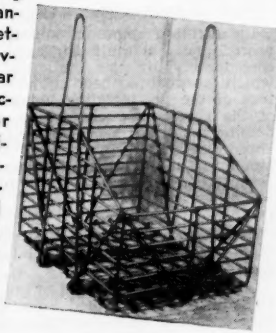
A combined meeting of the Montreal Chapter A.S.M. and the Montreal Branch, American Foundrymen's Association, in February featured John Perkins, assistant foundry superintendent, Ford Motor Co., Detroit, as the principal speaker on the subject of "Centrifugal Casting."

Mr. Perkins opened with a short chat, referring to the molder in the sand casting foundry, entitled "The Sand Rat and Modern Science." "The sand rat," he said, "plays a very important part in that the modern metallurgist can only go so far in the development of a casting practice. The proper location of the gates and risers depends largely upon the good judgment of the molder."

The technical portion of Mr. Perkins' talk was reported in the February issue of THE METALS REVIEW when it was presented before the Manitoba Chapter.

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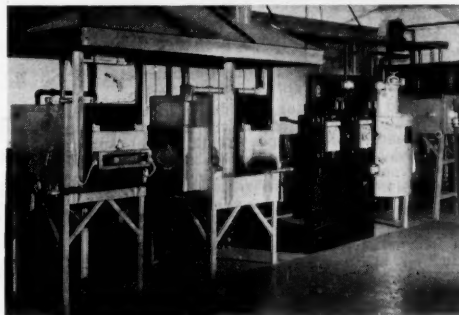
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A.S.M. Review of Current Metal Literature—Continued

18. HEAT TREATMENT

18-38. **A Note on the Relationship Between Preliminary Heat Treatment and Response to Nitriding of Some Nitriding Steels.** C. C. Hodgson and H. O. Waring. *Iron and Steel Institute Advance Copy*, Dec. '44, 16 pp.

In nitriding some chromium-bearing steels it has been found that the hardness of the case is influenced considerably by the preliminary heat treatment to which the steel has been subjected. This is particularly true of the pre-nitriding tempering treatment. Steels of the chromium-molybdenum and chromium-molybdenum-vanadium types are considerably affected. A chromium-molybdenum steel containing a notable amount of aluminum is scarcely affected at all in this respect. Details of the experimental work described and illustrated. 8 ref.

18-39. **The Influence of the Heat Treatment of Steel on the Damping Capacity at Low Stresses.** Leopold Frommer and A. Murray. *Iron and Steel Institute Advance Copy*, Dec. '44, 9 pp.

Electromagnetic method of inducing torsional oscillations in freely suspended cylindrical steel bars used for measurements of the damping capacity up to a maximum stress of 100 psi. Six specimens, each 3 in. in diameter and 3 ft. long, all from the same melt, with a composition normal to a 0.6% carbon steel. Measurements were made in the normalized, 830° C., oil quenched and the fully tempered conditions; by successive heat treatment these conditions were repeated. The measurements showed that the damping value was a characteristic property which varied for each condition and was reproduced through two heat treatment cycles. 7 ref.

18-40. **Heat Treatment of Aircraft Parts.** Gerald Eldridge Stedman. *Modern Machine Shop*, v. 17, Feb. '45, pp. 124-130, 132, 134.

Outline of the equipment and processes used in the heat treat department of the Kansas City Plant of North American Aviation, Inc.

18-41. **Shrinking and Hardening in One Operation.** Charles O. Herb. *Machinery*, v. 51, Feb. '45, pp. 137-141.

Practice followed by the American Car and Foundry Co. in the assembly of Bulldozer tractor track rollers.

18-42. **Flame-Hardening Piston-Ring Grooves in Locomotive Pistons.** Stephen Smith. *Machinery*, v. 51, Feb. '45, pp. 161-162.

To reduce wear and prolong the life of steel piston-heads, a number of railroads are flame-hardening the walls of the piston-ring grooves or specifying that they be flame-hardened by the manufacturer. This operation is quite simple, and can be carried out with a minimum of equipment and set-up time by following standardized procedures.

18-43. **Isothermal Treatment of Pistol Parts.** Roy M. Ellis. *Iron Age*, v. 155, Feb. 8, '45, pp. 42-46.

"Austempering preferred" appears on many Ordnance drawings today. Those parts that cannot be made tougher or with greater impact strength by adding strengthening radii or by radical design changes, can be austempered in the liquid bath to meet severe service conditions.

18-44. **Induction Heating Conference Discusses Trends, Techniques.** *Iron Age*, v. 155, Feb. 8, '45, pp. 58-61.

New applications developed for peacetime use of induction, dielectric heating, following mass production utilization in war material.

18-45. **The Brazing and Hardening of Hydraulic Equipment.** Gerald E. Stedman. *Industrial Gas*, v. 23, Jan. '45, pp. 7-8, 26-27.

Discusses Adel heat treating techniques which involve the use of industrial gas for brazing and hardening.

18-46. **Application of Controlled Atmospheres to the Processing of Metals.** Part I. C. E. Peck. *Western Metals*, v. 3, Jan. '45, pp. 9-12, 15.

Outlines the principal types of atmospheres, and describes briefly the equipment available for producing these atmospheres; summarizes the application of these various atmospheres to a wide variety of heat treating processes now in active commercial use.

18-47. **Sub-Zero Treatment of Steel Increases Hardness and Stability.** Charles M. Parker. *American Machinist*, v. 89, Feb. 15, '45, pp. 116-118.

A three to six-fold increase in pieces per grind is reported for high speed steel tools subjected to cold treatment. What happens to the internal structure of the metal to bring about such worth-while results explained.

18-48. **Heat Treating Tubing Continuously.** Irwin H. Such. *Steel*, v. 116, Feb. 12, '45, pp. 94-95.

Method for applying continuous induction heating in annealing stainless steel tubing. Machine also used for heat treating other types of alloy steel, such as SAE 4130 and NE 8630. These steels may be quenched in oil after emerging from the heating coil without danger of fire.

18-49. **New Equipment—Heat Treating and Furnace Control.** *Iron Age*, v. 155, Feb. 15, '45, pp. 76-78.

Recent developments in heat treating furnaces, induction heating equipment and process control and testing machines are described.

18-50. **Bright Annealing Brass.** *Steel*, v. 116, Feb. 19, '45, pp. 130, 133.

Longest continuous conveyor-type salt bath furnaces full anneal 6000 lb. of brass cartridge cases per hour with unequalled absence of oxidation.

18-51. **Interrupted Quench in a Recirculating Air Draw Furnace.** J. L. Foster. *Industrial Gas*, v. 23, Feb. '45, pp. 12-14.

Basis of this article is to establish the proper heat treatment of various splined shafts made from SAE 4150 steel. (Paper presented before Midwest Industrial Gas Council, Peoria, Ill.)

18-52. **Induction Heating.** G. W. Birdsall. *Steel*, v. 116, Feb. 26, '45, pp. 80-81, 112, 114, 116.

Does important processing work. Cuts heat treating cycles from hours to seconds; enables heat treating to be done right at production line by girls who require no special training for the work; combines heat treating with shrink fitting on certain assemblies.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-30. **Presses, Forging and Molding Machines.** *American Machinist*, v. 89, Jan. 18, '45, pp. 291-299.

32nd annual review of presses, benders, die casting machines, molding machines.

19-31. **The Fabrication of Magnesium Alloys.** A. W. Winston. *Electrochemical Society Preprint* 86-26, Oct. '44, 15 pp.

Magnesium alloyed with other metals to give it valuable mechanical and other physical properties. The specific gravity of these alloys is only slightly above that of pure magnesium. The principal additions are aluminum, zinc, and manganese. Methods of making these alloys are presented in detail. Details on casting; extrusion (requiring billets of the highest possible quality); plate and sheet rolling; forging; die casting; fabricating; and finally the importance of properly designing structural parts of these magnesium alloys, in particular when applying the high strength extruded shapes and sheet.

19-32. **Composite Die Sections Save Time and Are Economical.** *American Machinist*, v. 89, Feb. 1, '45, pp. 103-105.

Such sections have been used extensively in the automotive field but it is anticipated that industrial applications will increase after the war.

19-33. **Structural Mill at the Fontana Plant of the Kaiser Company, Inc., Has Initial Annual Capacity of 200,000 Tons.** R. M. Bickerstaff. *Blast Furnace & Steel Plant*, v. 33, Feb. '45, pp. 223-231.

General arrangement of the structural mill discussed.

19-34. **Developments in the Lay-Out of Modern Wire Mills.** *Wire Industry*, v. 12, Jan. '45, pp. 35-36.

Initial rolling treatment; wide range of sizes; different cropping operations; zig-zag train, and control of loops formed; speed allowances; reeling arrangements.

19-35. **Recent Developments in Forging Practice.** W. W. Dykacz and L. B. Fonda. *Steel*, v. 116, Feb. 5, '45, pp. 128, 131, 166, 168, 170.

Types of forging hammers used in General Electric Company plants as well as the products and materials involved.

19-36. **Recent Developments in Swaging.** *Iron Age*, v. 155, Feb. 8, '45, pp. 50-51.

Cable swager redesigned into a fast, automatic die opening and automatic feeding unit requiring only 3 sec. for each operation; Hydro-Former, used not only for swaging ball fittings on cable, but also for the attachment of tube to solid fittings, balls to rods, hose to flexible tubes; an all-purpose swager for attaching aircraft fittings to steel cable that is now available for general use.

19-37. **Deep Drawing of Windshields for Heavy Calibre Shells.** *Steel Processing*, v. 31, Jan. '45, pp. 26-27.

Examples of progress in deep drawing.

19-38. **Forging Die Design.** John Mueller. *Steel Processing*, v. 31, Jan. '45, pp. 31-33.

The success of a "flash butt weld" forge combination.

19-39. **Pressure Control Gage for Hydraulic Presses.** C. W. Hinman. *Steel Processing*, v. 31, Jan. '45, pp. 35, 46.

Lack of a reliable method for obtaining an exact pressure from the ram each time it advances solved by use of an indicator gage attached to a press which normally operates at 2000 to 3000 psi.

19-40. **Forging Automobile Crankshafts on High Speed Mechanical Presses.** *Steel Processing*, v. 31, Jan. '45, pp. 49-51, 60.

Cost of press offset by economy of operation, less expensive foundation, reduction in maintenance expense, increased production, etc.

19-41. **Recent Developments in Forging Practice.** W. W. Dykacz and L. B. Fonda. *Steel*, v. 116, Feb. 12, '45, pp. 104, 139-140, 142, 144, 146, 148, 150.

Work done on forging presses and upsetting machines in General Electric plants. Heat treatment and testing methods also described. 13 ref.

19-42. **Contour Forming 302 1/4 H Stainless Steel Channels.** Jack A. Johnson. *Modern Industrial Press*, v. 7, Jan. '45, pp. 33-34, 36.

Development of a new design for an engine mount ring, which consists of an assembly of several curved channels formed from 302 1/4 H stainless steel.

19-43. **ABC's of Stretch Forming.** J. E. De Phelps. *Production Engineering & Management*, v. 15, Feb. '45, pp. 73-76.

Up-to-date information on how the stretch press operates. How sheet stock and extrusions are handled and what happens in forming them.

19-44. **Utility of Swager Increased by Redesign.** *Production Engineering & Management*, v. 15, Feb. '45, pp. 114-115.

Design changes in swaging machines have broadened usefulness of this equipment. Examples of application to production of aircraft cable attachments indicate even further diversification.

19-45. **Huge Press Extrudes Nickel-Alloy Tubing.** *American Machinist*, v. 89, Feb. 15, '45, pp. 126-128.

Various nickel alloys will be extruded in larger tubes (Monel to 7 1/4 in.) opening new fields to designers needing corrosion resistant and strong cylinders.

19-46. **Forging.** *British Steelmaker*, v. 11, Jan. '45, pp. 22-27.

Change in volume; grain direction; flow of metal; instructive experiment.

19-47. **The Trentwood Rolling Mill.** *Western Metals*, v. 3, Jan. '45, pp. 30, 32, 35-36.

Huge aluminum plant attests Alcoa's faith in Northwest.

19-48. **Press Forming Possibilities of Heavy Sheet and Plate.** *Product Engineering*, v. 16, Feb. '45, pp. 125-129.

Design possibilities in stamping, forming and drawing heavy metal sheet and plate in presses are discussed. Cold work in thicknesses up to 3/4 in. and hot work up to 3 1/2 in. are illustrated in various sizes and shapes of heavy wall parts.

19-49. **Revere's Magnesium Facilities.** W. B. Griffin. *Modern Metals*, v. 1, Feb. '45, pp. 8-11.

Outline of operations at a wrought magnesium plant. Revere is developing new markets for magnesium and is well equipped to supply a variety of wrought products.

19-50. **Aluminum Baggage Compartment Nose Door.** *Modern Metals*, v. 1, Feb. '45, pp. 27-28.

Spinning of light metals is becoming an increasingly important forming method in certain applications. Ease of forming, good quality and present economies of this method, will result in more widespread usage of spun parts in the future. The nose door compartment is being spun by the Milwaukee Metal Spinning Co. for Beech Aircraft.

19-51. **Structural Mills and Structural Roll Designing.** Ross E. Beynon. *Iron and Steel Engineer*, v. 22, Feb. '45, pp. 35-52.

Describing structural mill layouts, pointing out the progress in the rolling of structural materials, and outlining some of the roll designs used in structural mills.

20. MACHINING AND MACHINE TOOLS

20-31. **Glass-Fabric Jig Devised for Drilling Contoured Surfaces.** Edward Prono and J. M. Butler. *American Machinist*, v. 89, Jan. 4, '45, p. 87.

Structure built-up in 19 layers used instead of metal jig for locating and drilling holes in wing part of experimental airplane.

20-32. **Direction of Cut Affects Forces in Milling.** M. Martellotti. *American Machinist*, v. 89, Jan. 4, '45, pp. 97-100.

The hand of the helix and the hand of the cut have a direct effect on design of milling fixtures.

20-33. **Well Designed Fixtures Speed Machining of Gun Mount Parts.** J. B. Miller. *American Machinist*, v. 89, Jan. 4, '45, pp. 102-106.

Set-up time reduced by 75 to 80% through tooling which positions parts accurately and holds them rigidly for machining.

20-34. **Practical Ideas.** *American Machinist*, v. 89, Jan. 4, '45, pp. 107-112.

Gage attachment helps layout scribing and inspecting. Spring clamp speeds up milling of small parts. Sub-bolster eliminates die breakage on punch press. Improved shrinking die with roller-activated jaws. Lathe die attachment for machining threaded bolts and studs. Equalizing fixture has spring-backed jaws to assist unloading. Holder and guide plate facilitate regrinding of small tool bits. Contours of large gear teeth restored by grinding. An economical method for making high speed button dies. Automatic stop prevents damage of turret lathe parts.

20-35. **Machine Tools.** *American Machinist*, v. 89, Jan. 18, '45, pp. 103-112, 117-124.

32nd annual review of boring and broaching machines, cut-off machines, drilling and countersinking, boring and gear finishing, shaving, grinding and broach sharpeners, thread and surface grinding, honing and grinding, grinding and lapping, chucking and turning, turning and milling, milling and shaping, tapping and thread rolling, miscellaneous.

20-36. **Tools and Accessories.** *American Machinist*, v. 89, Jan. 18, '45, pp. 181-212d, 212f, 212h, 212j, 212l, 213.

Review of work holders, tool holders, machine attachments, marking dies and machines, lubricant and scales, cutters, grinding wheels and dressers, measuring tools, power tools, hand tools, miscellaneous.

20-37. **Automatic Special Purpose Machine Tools of New Design.** Helmut Stein. *VDI Zeitschrift*, v. 88, nos. 17-18, April 29, '44, pp. 229-237.

Detailed description of automatic machine tools for different specific purposes.

20-38. **Correct Angles Improve Efficiency of End Mills and Side Mills.** M. Martellotti. *American Machinist*, v. 89, Feb. 1, '45, pp. 94-97.

Discusses various items to consider in selecting angles for milling.

20-39. **Special Tools Used to Machine Spherical Fits for Anti-Aircraft Gun.** *American Machinist*, v. 89, Feb. 1, '45, pp. 98-100.

Revamped boring mill and new work-holding fixtures are used to speed production of Army's powerful "stratosphere" weapon.

20-40. **High-Production Machine Tools.** *Steel*, v. 116, Feb. 5, '45, pp. 114-116, 156.

Save skilled labor and enable use of women workers.

20-41. **British Developments in Cam Turning.** *Iron Age*, v. 155, Feb. 8, '45, p. 47.

Design principles in the profile turning lathe for multiple throw automotive camshafts; each individual tool is mounted in a slide, the in and out motion of which is controlled by a master cam which rotates at the same speed as the work.

20-42. **Tooling the Automatic Screw Machine, XII.** Noel Brindle. *Modern Machine Shop*, v. 17, Feb. '45, pp. 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162.

Using attachments to eliminate secondary operations; cross drilling; revolving taps and dies; drilling attachment.

20-43. **Gage Blocks Move Into the Shop.** Karl F. Kirchhofer. *Modern Machine Shop*, v. 17, Feb. '45, pp. 168-170, 172, 174, 176, 178, 180.

Shows typical examples of their use in machine shops. Outlines additional uses.

20-44. **Machining Aircraft Engine Propeller Shafts.** *Machinery* (London), v. 66, Jan. 4, '45, pp. 1-6.

Machining operations on the forging for the propeller shaft from a forging of 3% chromium nitriding steel, having a tensile strength of more than 70 tons per square inch, and nitriding before the final grinding operations.

20-45. **Recent Developments in the Ryder No. 6 Verticalauto.** *Machinery* (London), v. 66, Jan. 4, '45, pp. 9-13.

Duplex control for Verticalauto, used when a simple part is being machined, and it is possible to do all the work at two working stations; and when the time cycle is such that one operator could not keep pace with the machine and load two parts at each indexing.

20-46. **Selecting the Correct Speeds and Feeds for Cylindrical Grinding.** S. S. Shoemaker. *Machinery*, v. 51, Feb. '45, pp. 158-160.

How speeds and feeds affect wheel action.

(Continued on Page 14)

Precision Castings, Powder Metallurgy, And Silver Brazing Covered in Symposium

Reported by Joseph M. Redinger, Jr.
General Manager, Thurston Mfg. Co.
and Melvin H. Knapp
Brown & Sharpe Mfg. Co.

Dire inroads into present machining operations were threatening as speakers presented their subjects to the Rhode Island Chapter in the December symposium. The meeting offered discussion of "New Metallurgical Developments" with specific titles of "Precision Casting", "Powder Metallurgy", and "Silver Brazing."

Lead-off man was Paul L. Butler from the Providence firm of Trifari, Krussman & Fishel, Inc. He explained how the "lost wax" technique had been borrowed from the jewelry and dental trades to cast commercial metals into intricate shapes having narrow tolerance limits. The process is necessarily expensive since careful manipulation and exacting metallurgical control are required. However, a dollar or so for a small casting might well be cheap for some of the production nightmares which have scores of delicate forming operations.

In practice, the process would be a source of amazement to any conventional foundryman, for the wax patterns from steel molds are fabricated into a wax "tree" complete with sprues, gates, and risers, and around this the mold is simply poured in the form of a siliceous paste. Following heat treatment to cure

the ceramic mold and eliminate the wax, the hot mold is mounted in a centrifugal casting machine for pouring.

Selection of suitable ceramic materials is a principal problem in casting high melting point commercial metals. A prospective modification of the process is the substitution of inexpensive plastic patterns for the more expensive and fragile ones now made from wax.

In the second presentation, William P. Matthew of Comstock & Wescott, Inc., Cambridge, Mass., explained how the powder metallurgy technique is being employed to form ferrous and other inexpensive commercial alloys. The process provides the special features of porous structure (for example in oil-less bearings and metallic filters), and of bonding unlike materials into a unit substance (tungsten-copper electric contact points having the wear resistance of the one metal and the conductivity of the other).

However, the process has been sufficiently developed so that it is now possible to produce competitive small parts from steel and other commercial metals. Although there are some limitations in the shapes which may be made and at present orders of 10,000 pieces or more are considered necessary to absorb development and die costs, once in production parts may be turned out rapidly and relatively inexpensively by the powder process. Steel parts may be made from powders to densities and physical properties approaching those of the wrought material.

The final talk on silver brazing was delivered by A. M. Setapen of the Industrial Engineering Division of Handy & Harman, New York. Strong, low melting point silver solders have increased tenfold in usage because of early successful applications in the fabrication of war equipment. In a particular example welding of chemical shell bodies proved unsatisfactory because of porosity. Application of the silver soldering technique drastically reduced rejections without introducing a much feared problem of corrosion.

Slight modification of design often allows silver solders to be used with increased effectiveness. Thus it is not necessary to depend on the usual small fillet when the brazing material may be caused to flow by capillarity throughout the full area of a joint.

Also discussed were the advantages attendant to the low temperatures used for silver brazing. Among these are low distortion, good uniformity of bond, small material usage, rapid operation with low power consumption, a minimum of discoloration, easy cleaning, and low over-all cost.

While it cannot be said that these several processes might not prove competitive with one another and with present machining practices, it appears that the scope of each is more or less defined by size, shape, cost, or quantity limitations and that the fields of application are only partially overlapping. It was judged that the discussed developments would become valuable adjuncts to present metal forming methods without necessarily promoting an abrupt upheaval in industrial production.

Almen Discusses Pre-Stressing by Peening, Shot Carburizing and Nitriding

Reported by H. B. Northrup
Director, Mineral Industries Extension Services
Pennsylvania State College

Faculty and students of the Schools of Mineral Industries and Engineering assembled on Feb. 3 to hear J. O. Almen of the General Motors Research Laboratories address the Penn State Chapter of A.S.M. on "The Effect of Residual and Pre-Stresses on the Fatigue and Bending Strength of Metals." The speaker presented a comprehensive discussion of the subject and must be congratulated on his excellent illustrative material, which assists the audience definitely to retain many of the ideas.

The material covered by Mr. Almen has been presented previously in THE METALS REVIEW and the reader is referred to his excellent articles on the subject (e. g., METAL PROGRESS, February, 1943). Mr. Almen expanded on these and presented many case histories to illustrate the advantages of pre-stressing by shot peening, carburizing and nitriding, as well as the very definite possibility of overlooking it.

Several provocative statements by the speaker precipitated a lengthy and lively discussion period.

Duraloy Purchases Interest From U. S. Pipe

The Duraloy Co., Scottsdale, Pa., announces the purchase from the United States Pipe and Foundry Co., Burlington, N. J., of its interest in the Duraloy Co.

Plastics Not Substitutes For Metals, Rockford Told

Reported by Carl H. Muehlemaier
Metallurgist, O. T. Muehlemaier Heat Treating Co.

In a comprehensive talk on plastics before the Rockford Chapter on Jan. 17 Paul C. Tietz of the Richardson Co., Melrose Park, Ill., repeatedly emphasized his belief that plastics must not be regarded as substitutes for metals. They should instead be looked upon as advantageous complements of metals, provided they are properly selected.

Mr. Tietz described the two general classes of plastics—thermosetting materials, which once molded are permanent, and thermo-plastic materials which can be molded to permanent solids at moderately elevated temperatures but will soften at higher temperatures and can be repeatedly remolded.

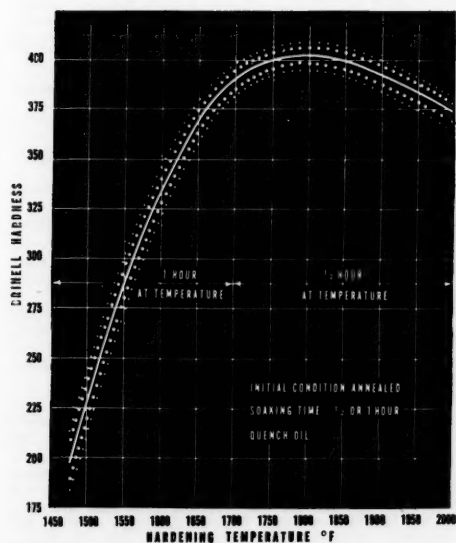
In each of the two groups of plastics there are many types which have particular corrosion, temperature, color, electrical and strength characteristics that must be taken into consideration from both the fabrication and use standpoint.

Laminated plastic materials made by hot compressing pre-coated sheets of canvas, paper, or glass cloth have shown remarkable strength properties at little or no sacrifice in the corrosion resistant properties of the particular plastic being used. A fairly well known application of laminated plastics is in timing gears, which have a desirable noise-free property.

What is the effect of Hardening Temperature

ON THE QUENCH HARDNESS OF STAINLESS STEEL?

TYPES 410, 403 and 416



When certain intermediate hardness ranges are specified, as they sometimes are for stainless steel types 410, 403 and 416, the data in this chart can often be usefully employed. This chart is typical of the type of authoritative information contained in Rustless' booklet, "Heat Treatment of Stainless Steels." This comprehensive booklet was designed specifically for metallurgists, engineers and shop men. Much of the mate-

rial has never before been published. Subjects treated include hardening, surface hardening, stress-relieving, tempering and annealing, and in addition type of equipment, furnace atmospheres, removal of scale, passivation, and hardness testing. This invaluable booklet contains 56 pages, plus removable cards containing condensations of the instruction for each standard grade of stainless. Sent free upon request.

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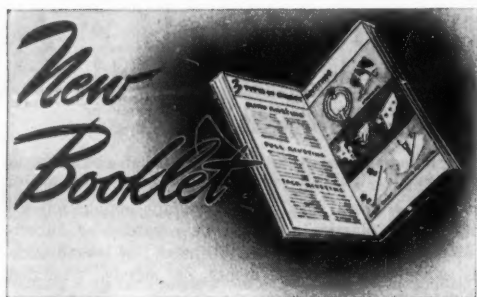
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"HD" TIPS ARE STRONG
Tip is firmly supported—underside is diamond ground, and rests on plane surface of recess which is finished true with Kennametal Milling Cutter or End File. Thermally strain-free assembly also helps prevent tip breakage.

TIP WHEN NEW—
AFTER MANY REGRINDS—
MAJOR PART OF TIP USED

When dull, tip can be advanced, and resharpened time and again, until the major part of it has been used.

ECONOMICAL REGRINDING
Only the tip is reground—no shank steel is removed. Operation is fast—clogging of diamond wheel grinder with steel is prevented.

STREAMLINED DESIGN
Smooth, unimpeded chip flow assured by improved clamping arrangement, correctly positioned. HD design employs pressures set up in cutting as factors to help hold tip in place.



for HEAVY-DUTY Machining on Steel and Cast Iron

Kennametal HD Clamped-On Tools make practicable high rate carbide machining on heavy steel forgings, castings, and bar stock, and cast iron, because the strength of the special HD tips and the perfected design of the tool enable deep cuts and heavy feeds to be taken at intermediate speeds, with amazing tool life.

HD Tools are now available in two styles—11HD and 12HD—for heavy duty turning and boring operations, with special HD tips in Grade KM for general steel cutting, Grade K2S for machining very rough or scale steel castings, and Grade K6 for cutting cast iron. Larger sizes, i.e., with shanks 1" to 2" wide, are now being produced.

Catalog information, and prices, will be sent immediately upon request.

ONE SHANK SERVES FOR THE LIFE OF MANY TIPS
FEWER TOOLS REQUIRED
Many tips can be used during the life of a shank, and tip of suitable Kennametal composition can be used for each job.

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Metal Literature Review—Continued

20. MACHINING (cont.)

20-47. **Differential Hobbing Solves Spur-Gear Problem.** Victor E. Francis. *Machinery*, v. 51, Feb. '45, pp. 163-165. Mathematical development.

20-48. **Crushing Wheels for Form-Grinding Without Special Equipment.** W. Zikel. *Machinery* (London), v. 66, Jan. 18, '45, pp. 61, 67.

In the mass-production of precision form parts, the method of forming the grinding wheel by crushing is gaining popularity. It combines accuracy with simplicity of producing the form and eliminates expensive diamonds and special equipment.

20-49. **Automatic Machine Tools Prove Their Economy.** P. W. Brown. *Production Engineering & Management*, v. 15, Feb. '45, pp. 67-70.

Comparison of production efficiency, initial and operating costs of special purpose machines and single purpose equipment is shown in experience of aircraft engine manufacturer who boosted output 2200%. The record is a tribute to machine tool industry.

20-50. **Grinding Radius.** Charles L. Hall. *Production Engineering & Management*, v. 15, Feb. '45, pp. 71-72. Easy method of producing forming tool angles which hold their accuracy through continued regrinding.

20-51. **Production Shaping.** John E. Hyler. *Production Engineering & Management*, v. 15, Feb. '45, pp. 92-94.

Modern machine and accessory designs boost the output of the shaper, so that it is becoming a more important production tool in many shops. Tool setting and gaging devices, methods for faster setup and machine operation, and contour control indicate the trend toward improvement.

20-52. **Small-Hole Grinding With Diamond-Charged Mandrels.** Frederick C. Victory. *American Machinist*, v. 89, Feb. 15, '45, pp. 107-110.

Round, straight holes in dies and gages can be produced to tenths faster with a mandrel charged with the proper grade of diamond dust than by use of small mounted wheels.

20-53. **New Cutter Doubles Production.** W. Bader. *American Machinist*, v. 89, Feb. 15, '45, p. 121.

Polishing time on the master rods was reduced so much that special grinding was avoided.

20-54. **Special Rake Angles Used for Sintered Carbide Tools.** M. Martellotti. *American Machinist*, v. 89, Feb. 15, '45, pp. 122-125.

When choosing rake angles for milling cutters the effective rake should be kept in mind. Tells how to compute it.

20-55. **Copper Cushions Benefit Carbide-Tipped Tools.** William A. M. Welles. *American Machinist*, v. 89, Feb. 15, '45, p. 128.

The use of copper cushions under the carbide tips of cutting tools has doubled the output between grinds. Chip-breaker dimensions are governed by the material to be cut.

20-56. **Interchangeable Assembly Units Coordinated by Master Tooling.** Stanley E. Vickers. *American Machinist*, v. 89, Feb. 15, '45, pp. 129-133.

Application of the three basic elements—match plates, drill plates and construction gages—is shown for master tooling.

20-57. **Light-Duty Radial Drill Made From Standard Units.** *American Machinist*, v. 89, Feb. 15, '45, p. 134.

Light-duty radial drill unit speeds operation on the top carriage of the Army's 4.7-in. anti-aircraft gun. Sketch shows that the base and height of the light-duty drilling machine and the main support arm can be varied if necessary.

20-58. **Practical Ideas.** *American Machinist*, v. 89, Feb. 15, '45, pp. 135-140.

Adjustable swivel plate simplifies grinding of cams for automatics. Turning jacks for B-29 cabin section. Roller cutter tool cuts fuel line tubing without burring. Stop for engine lathe cross-slide useful in small shop work. Boring-bar support avoids resetting work on radial drill. Plier vise attachment facilitates welding of rectangular parts. Vise stops facilitate production of duplicate parts. Molding of small plastic parts facilitated by special fixtures. Easily removable stop collar with counter-sunk cap screws. Insulation stripping tool eliminates wire damage.

20-59. **Favored Practice in Machining Zinc Alloy Die Castings.** II. Die Castings, v. 3, Feb. '45, pp. 64, 66, 68-69. Data on threading and reaming.

20-60. **Basic Principles of Centerless Grinding.** Louis Dodge. *Machine Design*, v. 17, Feb. '45, pp. 157-162. Unifies and augments the current knowledge concerning the theory of centerless grinding. Illustrations and tables. 8 ref.

20-61. **Crushed Wheel Dressing in Form Grinding.** Richard Y. Moss. *Iron Age*, v. 155, Feb. 15, '45, pp. 56-59.

Production and laboratory tests indicate that a crusher dressed grinding wheel has faster and cooler cutting action and longer life per dressing than a diamond dressed wheel. The time required to dress the wheel is greatly reduced on intricate profiles, due to the simplicity of the operation.

20-62. **Equipment Can Do Twice as Much.** H. C. Geping. *Iron Age*, v. 155, Feb. 15, '45, pp. 64-65.

A typical case of not having enough machines to meet production schedules on the machining of a badly needed airplane manifold is cited as one example of how to make possible the delivery of the right part in the right place at the right time.

20-63. **Improved Method of Precision Boring.** C. R. Phiffer. *Iron Age*, v. 155, Feb. 15, '45, p. 75.

Machining two close tolerance holes in bronze bushings in aluminum gear assembly supports, produces approximately 125 pieces, per hr.

20-64. **Negative-Rake Milling.** J. G. Holmes and R. C. Holloway. *Aircraft Engineering*, v. 17, Jan. '45, pp. 27-28.

Work has been confined to tough 4140 chromium-molybdenum steel forgings; besides stepping up the rate of cutting, a greatly superior finish is secured and close limits, held only with difficulty before, are readily held now. Many more forgings are machined per grind, hence down time is decreased. In no case is more than one cut required, the depth ranging from 1/4 to 1/2 in. Some surfaces which had to be ground after milling with prior practice are now finished in a single cut. (Reprinted from the April, 1944, issue of *Wings*.)

21. LUBRICATION AND FRICTION; BEARINGS

21-13. **Bearing Strength of Porous Iron Bushings.** E. Heidebrock. *VDI Zeitschrift*, v. 88, no. 15-16, April 15, '44, pp. 205-207.

The opinions concerning the applicability of porous iron bearings are contradictory. It seems that, only after consideration of all data from tests performed under the conditions of practical application, the possibility of the use of such bearing may be determined in each individual case.

21-14. **Adequate Piston Cooling—Oil Cooling as a Means of Piston Temperature Control.** Gregory Flynn, Jr. and Arthur F. Underwood. *S.A.E. Journal*, v. 53, Feb. '45, pp. 120-128.

Increasing engine outputs have required methods to control the piston temperature; use of a piston of low conductivity, correlated with an appropriate rate of piston cooling oil from the engine lubrication system. The effects of coolant temperature, load, and speed over the propeller load curve, and a piston baffle, on piston temperatures are investigated by thermocouples silver soldered in a 6 x 6 1/2-in. diesel, two-cycle piston. Tests indicate that the rate of cooling oil does not have to be excessive to secure adequate cooling. Substantiating data from an 8 x 10-in. diesel engine are given. Steel piston designs for use with jet oil cooling are shown. These are for the 6-in. diesel on which most of the data for the paper were taken.

21-15. **Measuring the "Existent Corrosivity" of Used Engine Oils.** R. G. Larsen, F. A. Armfield, and L. D. Grenot. *Industrial & Engineering Chemistry (Analytical Ed.)*, v. 17, Jan. '45, pp. 19-24.

A test for determining the "existent corrosivity" of used engine oils independently of previous history provides a means for evaluating in simple fashion, by the use of test strips coated with lead or other metal in graduated thicknesses, a property of used oils not heretofore satisfactorily measured by routine engine oil tests. It also has practical application in determining the cause of bearing failures and indicating necessary oil drain periods. 13 ref.

21-16. **Friction of Ball and Roller Bearings.** *Machinery* (London), v. 66, Jan. 18, '45, pp. 69-72.

Data given on the effect of various factors affecting friction, i.e., design, lubrication, load and speed, and an attempt to correlate the information on the effect of speed on frictional torque. 8 ref.

21-17. **Oil and Material Recovery in an Aircraft Plant.** *Machinery* (London), v. 66, Jan. 25, '45, pp. 81-86.

The oil-recovery methods at a Rolls-Royce aero-engine factory.

21-18. **Lead-Base Babbitt.** R. G. Thompson. *Metal Industry*, v. 66, Jan. 26, '45, pp. 55-56.

Centrifugal and stationary casting techniques; when tin was readily available it was customary to use a composition of 83 1/3% tin and 8 1/3% each of copper and antimony for babbitt. Experience of the General Electric Co. of America in the use of low-tin bearing alloys.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-54. **Welding Developments in 1944.** Guy Bartlett. *Steel Processing*, v. 31, Jan. '45, pp. 29-30.

Gas-shielded arc welding; electrodes; resistance welding.

22-55. **New Silver Soldering Technique Improves Production.** C. A. Medsker. *Steel Processing*, v. 31, Jan. '45, pp. 34, 38.

New technique for the use of silver solder and other low melting point alloys in production has practically eliminated the principal non-productive finishing operations. Automatic supply of flux to the joint in the correct amount and at a uniform rate.

22-56. **Fabrication of All-Welded Steel Equipment and Its Application to the Ceramic Industry.** E. A. Hawk. *American Ceramic Society Bulletin*, v. 24, Jan. 15, '45, pp. 12-15.

Progress of welded construction reviewed and some of the difficulties encountered discussed. Ways and means of eliminating most of the problems affecting welded friction and anti-friction bearings in line also discussed. Automatic equipment for cutting shapes from steel plates, such as the pantograph machine, described.

22-57. **Silver Alloy Brazing with Induction Heating.** A. M. Setapen. *Electrochemical Society Preprint* 86-25, Oct. '44, 21 pp.

With low temperature (700° C.) silver brazing alloys there are definite advantages in using induction heating; the operations are extremely simple and uniform results are obtained; comparatively small amounts of brazing alloy are required. The over-all cost is low. High frequency induction heating results in very rapid brazing and in confining the heat to a minimum area and, therefore, minimum annealing, minimum distortion, and minimum surface oxidation of the metals being joined.

22-58. **Parallel Connection of Welders Provides Heavier Currents for Automatic Welding.** I. B. Yates. *Machinery*, v. 51, Feb. '45, pp. 153-155.

Use of continuous electric welding by means of automatic welding heads, requiring current supply in the 700 to 2000 ampere range, has raised the question of whether smaller capacity welding generators or transformers can economically be connected in parallel to provide these heavy currents, and if so, how should the connections be made.

22-59. **Improved Arc-Welded Construction for Steel-Plate Forming Dies.** *Machinery*, v. 51, Feb. '45, pp. 170-172.

Method of constructing forming dies for heavy steel plate by arc welding and the use of concrete between reinforcing beams (abstract of an article entered in the James F. Lincoln Arc Welding Foundation Annual Program by Walter E. Klauber).

22-60. **Copper-Brazing of Steel Assemblies.** J. D. Jevons. *Canadian Metals & Metallurgical Industries*, v. 8, Jan. '45, pp. 24-26.

Methods, equipment, inspection, joint strength and applications.

22-61. **Effect of Time of Storage on Ductility of Welded Test Specimens.** Clarence E. Jackson and George G. Luther. *Metals Technology*, v. 12, Jan. '45, T.P. 1772, 8 pp.

Methods considered: Those that measure directly the effect of welding on the ductility of a steel, and those that observe the change in some property, such as the hardness of the heat-affected zone, and assume a direct correlation between this change and the resultant ductility. 3 ref.

22-62. **Trends in the Use of Welded Machinery Parts.** Edward J. Charlton. *Mechanical Engineering*, v. 67, Feb. '45, pp. 109-118, 129.

Discussion limited to components fabricated from low carbon, hot rolled steel and its related alloys. Reasons for trends in use are comparative first cost, predictability, strength characteristics, need for greater rigidity, weight reduction, wearability, operating efficiency, and natural adaptability.

22-63. **The Degree of the Heat Efficiency in Different Methods of Industrial Welding.** H. Koch. *VDI Zeitschrift*, v. 88, no. 15-16, April 15, '44, p. 209.

The efficiency of heat is determined for each individual welding method. A comparison of heat efficiency of several welding methods is made by the use of plotted curves.

22-64. **Acid-Resisting Steels—II.** *Chemical Age*, v. 52, Jan. 6, '45, pp. 15-16.

Welding of acid-resisting Cr-Ni steels and Cr-Mn steels.

22-65. **New Miniature Electric Arc Welding Appliances.** *Luftwissen*, v. 10, July '43, p. 202. *Welding Literature Review*, v. 6, Feb. '44, p. 3.

Miniature welding appliances brought out by Siemens and Halske intended to replace soldering previously employed in instrument manufacture. Leads to a considerable economy in tin, and work is speeded up since the rather complicated cleaning of the joint, which is essential in soldering, is much simplified.

22-66. **Shipyard Welding.** H. F. Bibby. *Metrop-Vickers Gazette*, v. 20, Oct. '43, pp. 208-225. *Welding Literature Review*, v. 6, Feb. '44, pp. 4, 5.

Before arc welding can be universally welcomed questions on the technique must be answered and doubts existing on certain points cleared up. Some of these questions are: (1) The relative merits and demerits of a.c. and d.c. welding; (2) the relative merits of single and multi-operator sets; (3) the relative costs of different types of equipment; (4) the plant and accessories required for building a 10,000-ton ship; and (5) the effect of the welding load on the supply.

22-67. **Low-Temperature Brazing With Silver Alloys: Technique for Economical Production and High-Duty Product.** A. J. T. Eyles. *Mechanical World*, v. 114, Dec. 3, '43, pp. 642-644. *Welding Literature Review*, v. 6, Feb. '44, p. 11.

Low-grade brazing alloys cost less per joint, but this is offset by the high temperatures required to melt them. By taking proper care in the design and fitting of a joint, such a small amount of the silver alloy is needed that the saving in time and fuel offsets the higher cost of a more expensive alloy with lower melting point.

22-68. **Rightward or Leftward Welding Technique.** W. Heiz. *Schweiz. Tech. Zeitschrift*, no. 23 and 24, '42, pp. 326-333. (Translated in *Sheet Metal Industries*, v. 18, Oct. '43, pp. 1801-1802, 1804; Nov., pp. 1983-1984, 1986.) *Welding Literature Review*, v. 6, Feb. '44, p. 16.

Rightward (or backward) and leftward (or forward) techniques in gas welding and their fields of application.

22-69. **Spot Welding in the Light Metal Industries.** F. Helbing. *Schweiz-Tech. Zeitschrift*, no. 26, '42, pp. 373-378. (Translated in *Sheet Metal Industries*, v. 19, Jan. '44, pp. 147-150, 152.) *Welding Literature Review*, v. 6, Feb. '44, p. 24.

Development of light alloy spot welding and gives a list of suitable materials. Preliminary surface cleaning of the sheet and suggests suitable methods of pre-assembly before welding.

22-70. **Are Weld Surfacing.** W. I. Miskoe. *Modern Engineer*, v. 17, Sept. '43, pp. 197-201. *Welding Literature Review*, v. 6, Feb. '44, p. 33.

Arc weld surfacing is building up of metal surfaces with deposits similar to the parent metal, as well as with alloys of all types, the deposit of which is designed to produce a result which is superior under service conditions to that of the parent metal. Choice of proper electrode.

22-71. **Spot Welding of Aluminum Alloys in Aircraft Construction.** A. V. Zeerleder. *Inter-Avia*, Aug. 9, '43, pp. 1-7. *Welding Literature Review*, v. 6, Feb. '44, pp. 44, 45.

Test figures show that spot welds of high and consistent strength in aluminum alloys can be achieved, provided the welding machine is controlled properly. Average shearing strength in kg. per spot given.

22-72. **The Welding of a Cylindrical Bulk Fuel Tank.** R. G. Colvin. *New Zealand Institute of Welding*, Feb. '43, pp. 6-15. *Welding Literature Review*, v. 6, Feb. '44, p. 63.

Fabrication and erection of a cylindrical fixed cone roof bulk fuel tank from the point of view of the welder.

22-73. **Emergency Railway Bridges Made by Unit Construction.** *Steel*, v. 116, Feb. 12, '45, p. 92.

Drift pins and bolts used in assembling demountable spans featuring interchangeable members.

22-74. **Helix-Type Manifolds.** *Steel*, v. 116, Feb. 12, '45, pp. 96-97, 102.

For supercharged diesel engines are fabricated by electric welding.

22-75. **Welded Joint Design in a Die Cast Assembly.** Jerome R. Peskin. *Die Casting*, v. 3, Feb. '45, pp. 21-22, 24.

Assembly of the Army M-10 range finder was greatly simplified by the development of a welding procedure whereby die castings could be satisfactorily joined to a section of aluminum tubing. This previously had never been done—and is a method that may well be studied by engineers for many products now going "on the boards."

22-76. **Spot Weld Characteristics of Aged 24S Aluminum.** M. L. Ochiano. *Product Engineering*, v. 16, Feb. '45, pp. 90-92.

Quality of spot welds in artificially aged 24S aluminum, conventional methods employed in producing them, and methods of investigating strength are described to show that satisfactory spot welds can readily be produced.

22-77. **Causes and Prevention of Defects in Welding.** Frederick S. Dever. *Product Engineering*, v. 16, Feb. '45, pp. 121-124.

Common defects encountered in arc welding, gas welding, atomic hydrogen welding, and spot welding are described. Proper technique and procedures to insure good welds are suggested to show that defective welding can be prevented.

22-78. **Forging on a Spot Welder.** G. W. Birdsall. *Steel*, v. 116, Feb. 19, '45, pp. 106-107, 146, 148, 151, 152.

Newly developed resistance welding systems with variable pressure and current cycles under precise automatic control greatly extend range of operations that can be handled. Unusual forging and welding jobs illustrate possibilities.

22-79. **Trends in the Use of Welded Machinery Parts.** Edward J. Charlton. *Steel*, v. 116, Feb. 19, '45, pp. 112-114, 116, 118, 160, 162-163.

Judging from the important place welded construction has already assumed in fabrication of machinery parts, the author predicts further extended growth and analyzes the underlying factors responsible in this report presented before the A.S.M.E.

22-80. **The Welding of Process Piping.** Arthur N. Kugler. *Heating and Ventilating*, v. 42, Feb. '45, pp. 57-62, 123.

Discusses pipe metals. Chart enumerating some of the more commonly encountered piping materials, and methods to follow when joining one metal to another.

22-81. **Welding and Cutting in Steel Plant Maintenance.** S. D. Baumer. *Iron and Steel Engineer*, v. 22, Feb. '45, pp. 80-88.

Through the ingenious use of welding and cutting, maintenance men have been able to overcome shortages and shorten delays, thus keeping production at a maximum; typical examples set forth here also show attractive economies.

22-82. **The Inclination of Welds to the Direction of Stress and Its Influence on Tensile Strength.** H. Zschokke and R. Montandon. *Brown Boveri Review*, v. 31, June '44, pp. 187-196.

When computing welds it is common practice to assume a higher point efficiency along the weld than perpendicular to it. Consequently, inclination of the weld in the direction of stress should bring about an increase in load, and this assumption has led to some firms adopting spiral welds in pipe-line and boiler construction. Tests on tensile bars and model boilers, however, have now shown that it is only with relatively low joint efficiencies and very small angles between the axis of the weld and the principal direction of stress that any real increase in load can be achieved.

22-83. **Pressure-Welded Pipe Line.** Elton Sterrett. *Welding Engineer*, v. 30, Feb. '45, pp. 37-39.

Designed primarily to weld railroad rails, the oxy-acetylene pressure welding process has been extended successfully to the construction of natural-gas pipe lines of larger diameter. Article gives details.

22-84. **Training QM Welders.** Charles B. Dunham. *Welding Engineer*, v. 30, Feb. '45, pp. 40-41.

G. I.'s who attend the blacksmith and welding school of the Army Service Forces Training Center, Camp Lee, Va., learn how to weld by using the most modern equipment.

22-85. **Welding Canada's New Frigates.** Donn Boring. *Welding Engineer*, v. 30, Feb. '45, pp. 42-44.

Despite British influence favoring traditional riveted construction, Canadian shipyards are turning more and more to welding. The trend is especially noticeable in the case of the Frigate—an old name for a new ship.

22-86. **Emergency in the Lead District.** R. A. Brady. *Welding Engineer*, v. 30, Feb. '45, p. 45.

When a wire cable cuts new grooves in a hoist sheave, what can be done to put it back in the old channel? Answer: Use arc welding.

22-87. **Arc-Welded Power Trucks.** C. E. Cochran. *Welding Engineer*, v. 30, Feb. '45, pp. 46-48.

To perform satisfactorily the various jobs of lifting, hauling, stacking, industrial lift trucks must combine mobility of a destroyer with a battleship's stamina. Welding enables them to stand up under rugged service.

22-88. **Improved Spot-Welding Control.** Harold J. Hague. *Welding Engineer*, v. 30, Feb. '45, p. 49.

The weld comparer makes use of the principle of the photoelectric cell to assure a continuous check of weld consistency. When this device is at work, welds of inferior quality can no longer sneak by unnoticed.

22-89. **Fabrication Cost vs. Width.** W. G. Theisinger. *Welding Engineer*, v. 30, Feb. '45, pp. 50-53.

To build the shell of a pressure vessel, which is more economical: a two-piece fabrication of wide plates or a three-piece or four-piece fabrication of narrower plates? Answer given here.

22-90. **Automatic Carbon-Arc Welding.** W. J. Conley. *Welding Engineer*, v. 30, Feb. '45, pp. 54, 56.

Aluminum is being successfully welded in production set-ups by means of the automatic shielded carbon-arc process. Speed, quality and economy can be obtained.

22-91. **Producing Gas Welded Tubing From 2500 Pound Coils of Strip.** J. N. Bohannon and F. Judelson. *Steel*, v. 116, Feb. 26, '45, pp. 84-85, 102, 105.

Steel in transit from strip mill to tube plant is prevented from shifting by careful banding and packing. Compensation for variations in skelp thickness, analysis and condition is effected by changing speed of strip going through mill rather than altering pressure of oxygen and acetylene. Electronic control widely employed. Looping system provides for joining of coil ends without interrupting welding operation.

22-92. **Tin-Free and Low-Tin Solders.** C. A. Reichelderfer and B. W. Gosner. *Steel*, v. 116, Feb. 26, '45, pp. 86-88, 90, 92, 132, 134, 136.

Extensive use of solders for joining has necessitated the development of substitutes to meet the critical shortage of tin. Physical properties, limitations and modes of application of alternate types worked out for the War Metallurgy Committee presented. 9 ref.

22-93. **Special Setups Speed Automatic Welding of Masts and Kingposts.** G. Eldridge Stedman. *Steel*, v. 116, Feb. 26, '45, pp. 94, 96, 99, 128.

Operating details.

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A.S.M. Review of Current Metal Literature—Continued

23. INDUSTRIAL USES AND APPLICATIONS

- 23-35. **Plant Service Equipment.** *American Machinist*, v. 89, pp. 339-350, 352.
32nd annual review of trucks and hoists, materials handling accessories, machine drives, couplings, belting and clutches, lighting equipment, fans, heaters, compressors, air cleaners, air cleaning and drafting, drafting and safety equipment, miscellaneous.
- 23-36. **Parts and Materials.** *American Machinist*, v. 89, Jan. 16, '45, pp. 361-364, 366, 368, 370-372.
Review of electrical controls, bearings, valves and fittings, materials, fastening devices.
- 23-37. **Three-Piece Mortar Shells Replace Forgings.** John Y. Blazek. *Metal Progress*, v. 47, Feb. '45, p. 273.
Conversion from a forged body for 4.2-in. mortar projectile to a short length of X-1335 seamless steel tubing, a base plug and a nose adapter, all three silver soldered (brazed) together, increased output of badly needed ammunition. Forging machines unnecessary and metal saved.
- 23-38. **Enemy Materiel from the Metallurgical Point of View.** J. R. Cady, H. W. Gillett and L. H. Grenell. *Metal Progress*, v. 47, Feb. '45, pp. 289-320.
Economic and technical aspects; German shortages; German armor; German projectiles; projectiles with tungsten carbide cores; metal in German guns; Japanese arms and ammunition; general conclusions about ordnance type of scrap used for steel in minor parts; vitel engine parts and valves; engine valves; non-ferrous alloys. 26 ref.
- 23-39. **Steel in Post-War Technology.** J. B. Austin. *Railway Age*, v. 118, Feb. 3, '45, pp. 272-273.
War-time metallurgical developments such as: (1) The use of boron in steel to enhance hardenability; (2) new knowledge, experience and steel compositions in connection with the use of steel at elevated temperatures; (3) the use of welding as a means of fabrication on many grades of steel that hitherto were considered hardly weldable; (4) the continued use of at least some of the NE steels will be used to advantage in postwar technology.
- 23-40. **Making 8-Inch Artillery Shells.** *Modern Industrial Press*, v. 7, Jan. '45, pp. 44, 46, 48.
Description of the steps in manufacturing and the accomplishments of one of the first concerns to make larger shells.
- 23-41. **Manufacture of Robot Bomb Engines.** S. H. Brams. *Iron Age*, v. 155, Feb. 1 '45, pp. 60-61.
Details of manufacturing robot bomb engines at Ford Motor Co.
- 23-42. **Light Alloy Cylinder Heads from German Aircraft Engines.** *Automotive Industries*, v. 92, Feb. 1, '45, pp. 29, 54, 58.
Metallurgical data obtained by investigation of the composition, construction and properties of three types of light alloy cylinder heads recovered from German aircraft engines.
- 23-43. **Recent Developments and Trends in Materials and Their Applications.** *Metals and Alloys*, v. 21, Jan. '45, pp. 85-95.
An over-all review of broad developments in the materials field, followed by many short reviews of the individual metals and non-metals that are of major interest to materials engineers, with emphasis on new and improved materials and application trends.
- 23-44. **Design Selection of Parts and Fabrication Methods.** *Metals and Alloys*, v. 21, Jan. '45, pp. 96-104.
A bird's eye view of the general situation involving the competing fabrication types or production methods from the design standpoint, followed by shorter articles, each reviewing application and design trends for a specific method of fabrication or type of part.
- 23-45. **Materials for Solving Specific Engineering Service Problems.** *Metals and Alloys*, v. 21, Jan. '45, pp. 104-108.
A comprehensive survey of recent broad trends in design engineering, followed by brief reviews of progress in applying materials to the solution of specific engineering service design problems.
- 23-46. **Chain-Making Equipment.** *Wire Industry*, v. 12, Jan. '45, pp. 27-29.
Development and processes described.
- 23-47. **Flame Cleans and Oils Rails for Road Crossings and Tunnels.** *Railway Engineering and Maintenance*, v. 41, Feb. '45, pp. 156-160, 164.
Motivated by an increase in recent years in the number of rail head and web separations occurring in paved road crossings and tunnels, which have been attributed partly to the effects of corrosion, The Norfolk & Western has started the practice of flame-cleaning and oiling all rails destined for use in such locations. Special equipment has been devised for applying this treatment in an effective manner, and somewhat similar equipment has been developed for treating joint bars.
- 23-48. **Induction Heating in Radio Electron Tube Manufacture.** E. E. Spitzer. *Electrochemical Society Preprint* no. 86-27, Oct. '44, 16 pp.
The radio electron-tube industry was one of the first to use induction heating extensively. The metal parts of the electron tubes must be heated to 500 to 1500° C. during evacuation in order to liberate gases occluded in the parts. Since the parts are in a vacuum and are usually surrounded by a glass bulb, induction heating is the ideal method of heating. Other similar applications are "getter" flashing and vacuum-firing systems. Still other applications are in sealing metal to glass, in brazing tube parts together, and in welding. Chief advantages are accurate control and speed of heating. The radio-frequency generators generally are of vacuum-tube type operating at about 200 to 500 kilocycles. Units of about 2 to 15 kilowatts are used. The theory of heating is developed from simple air-core transformer considerations and an example is given.
- 23-49. **Where to Find Special Information on Electronic Uses in Industry.** W. C. White. *Electronic Industries*, v. 4, Feb. '45, pp. 102-105, 172, 174, 176, 178, 180, 182, 184-188, 190, 192, 194.
List of references supplementary to those published in the June 1943 and February 1944 issues. 326 ref.

23-50. **Cast Crankshafts Successfully Used on Large Direct-Reversible Marine Diesels.** *Industry & Power*, v. 48, Feb. '45, p. 69.

Army tugs equipped with 8-cylinder diesels with cast crankshafts have given excellent service during thousands of hours of operation in the various war theatres. Continued research on the casting process may result in reduced costs in the postwar period.

23-51. **Enemy Metallurgical Practice.** *Steel*, v. 116, Feb. 19, '45, pp. 108-111, 154, 156, 158, 160.

This report on German and Japanese progress in metal working is based upon data presented by Col. J. H. Frye of the Office of the Chief of Ordnance before SAE. German practices are described as "efficient and advanced," in sharp contrast with unprogressive, extravagant methods of the Japanese.

23-52. **The Busy Line.** T. Frank Cassidy, Jr. *Die Casting*, v. 3, Feb. '45, pp. 28-31.

The use of die castings had an early start in the pioneer pay station telephone industry. The test of time has made these consistently used parts indispensable.

23-53. **Accounting for Accuracy.** F. E. LeBaron. *Die Casting*, v. 3, Feb. '45, pp. 36-41.

Besides the expected advantages of lower costs, greater accuracy and weight reduction, IBM engineers have found that die castings make many unusual contributions in their designs of business machines.

23-54. **Record Advances in Electronic Recording.** R. L. Stone. *Die Casting*, v. 3, Feb. '45, pp. 46-50.

In the commercial as well as military models of Soundscribe equipment the use of die castings has made possible the design of lightweight, compact, yet extremely rugged units which require no oiling and a minimum of field maintenance.

23-55. **Selection and Maintenance of Magnetic Brakes.** A. E. Lillquist. *Iron and Steel Engineer*, v. 22, Feb. '45, pp. 53-62.

Correct brake selection depends on the requirements of the specific application; proper maintenance and adjustment are essential to satisfactory performance.

23-56. **The Place and Effect of Conveyor Equipment in Industry.** J. E. McBride. *Iron and Steel Engineer*, v. 22, Feb. '45, pp. 70-79.

Conveyor equipment has played a major role in the industrial development of the United States; the steel industry is finding applications for some types of conveyors which were developed for other industries.

23-57. **Aluminum Structures.** *Modern Metals*, v. 1, Feb. '45, pp. 6-7.

Changing trend in structures towards aluminum. A good application for it.

23-58. **Prewar Germany's Light Metals.** Gert Ahrens. *Modern Metals*, v. 1, Feb. '45, pp. 12-14.

Light metal developments in prewar Germany.

24. DESIGN

24-17. **Designing of "Trouble-Free" Dies.** C. W. Hinman. *Modern Industrial Press*, v. 7, Jan. '45, pp. 18, 20.

High precision progressive dies.

24-18. **Aluminum Redesign of a Steel Truck.** William Graf. *Light Metal Age*, v. 3, Jan. '45, pp. 10-13.

Weight saving of 31 to 70% (depending on structural alloy used), decreased production cost and a sturdier product.

24-19. **Profit Shared Through Cooperation.** William S. Thomas. *Foundry*, v. 73, Feb. '45, pp. 88, 210, 212, 214, 216.

Designer must work in close contact with the foundryman to avoid or minimize defects; hot tears and shrinkage cavities usually are attributable to poor design; mold design should be considered before the pattern is laid out on the drawing board; examples show satisfactory results brought about by cooperation.

24-20. **Machine Tools for Tomorrow.** Joseph L. Trecker. *Production Engineering & Management*, v. 15, Feb. '45, pp. 102-103, 120.

Postwar forecast on trends in design and sales of metal-cutting equipment after victory is won.



THE New TINNEMAN HOSE CLAMP

This one-piece, ratchet type Hose Clamp is easily latched by hand, then quickly locked with pliers. Removed by prying locking tongue out of ratchet teeth with screwdriver. It weighs less, has a lower profile, exerts uniform pressure, and may be used over and over again. Approved by Army and Navy Air Forces. Sizes from 1/2" O.D. up. Write for details.

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24-21. **Permissible Angularity of Drill Bushings.** H. W. Palkowski. *Production Engineering & Management*, v. 15, Feb. '45, p. 99.

Formula for determining tolerance or permissible angularity of bushed holes.

24-22. **Current and Future Trends in General Industrial Design.** Harold Van Doren. *Metals and Alloys*, v. 21, Jan. '45, p. 84.

Progress made in industrial design during war years. New definition of industrial design given.

24-23. **Die Within a Die.** *Die Casting*, v. 3, Feb. '45, pp. 42, 44.

A special die design technique that makes possible the casting of a male thread having an axis parallel rather than at right angles to the direction of the die motion.

24-24. **How High Speed Photography Aids in Redesign.** W. S. Calvert, and H. D. Jackes. *Machine Design*, v. 17, Feb. '45, pp. 133-138.

Studies indicative of the motion analyses possible with high speed photography. Many design problems where dynamics become so involved that it is necessary to study actual operations in this way to ascertain how they agree with calculated performance.

24-25. **The Dimensioning of Production Drawings.** W. Barnes. *Machinery* (London), v. 66, Jan. 25, '45, pp. 89-92.

Object in making production drawings and essential requirements. Methods of dimensioning; fundamental principle in dimensioning.

25. MISCELLANEOUS

25-16. **Efficient Tool Control System Cuts Waste in War Production.** *American Machinist*, v. 89, Jan. 4, '45, pp. 83-86.

Survey at General Motors plant established a four-hour tool replacement schedule, minimized idle time at machines, and led to a sound tool-sharpening plan.

25-17. **Welding, Heat Treating, Cleaning and Finishing.** *American Machinist*, v. 89, Jan. 18, '45, pp. 311-327.

32nd annual review of welders, accessories, furnaces, heaters, temperature control, polishing, cleaning, finishing.

25-18. **Metal Marking.** John E. Hyler. *Steel*, v. 116, Feb. 5, '45, pp. 120-122, 124, 126, 158, 160, 162, 164.

Functions of printing, engraving, stamping, embossing, electrical marking and other kinds of scribing obtainable in diverse and highly specialized machines for metal marking.

25-19. **Modern Development of Production Control.** Franklin S. Atwater. *Production Engineering & Management*, v. 15, Feb. '45, pp. 104, 106, 108, 200, 202.

Broader concepts of production control point to efficient coordination of men, materials and machines. Principles outlined here—involving every production factor from planning operations to materials handling to inspection—are suggested for practical application throughout the entire shop.

25-20. **Backbone of Engineering.** *Scientific American*, v. 172, Feb. '45, pp. 95-97.

Continuing development of metals and alloys is giving the mechanical engineer new tools with which to work. What metallurgy is doing now will have a direct effect on the progress that will be made in the future. New materials mean better machines and prime movers.

25-21. **Developments and Trends in Fabrication and Treatment.** *Metals and Alloys*, v. 21, Jan. '45, pp. 114-133.

Passing parade of broad developments in the whole field of materials processing. Individual methods and processes include rolling, forging, machining, heat treatment, welding, cleaning, finishing.

25-22. **The Principles of Mechanical Handling.** J. V. Smith. *Foundry Trade Journal*, v. 75, Jan. 18, '45, pp. 45-48.

Obtaining maximum results from plant laid down for post-war production. 2 ref.

25-23. **Metal Marking.** John E. Hyler. *Steel*, v. 116, Feb. 12, '45, pp. 98-100, 130, 132, 134.

Equipment and small tools available for scribing, etching, stamping or printing metals is augmented by metal-writing pencils, crayons, layout dopes and paints for hot or cold marking. 17 ref.

25-24. **Industrial Research.** W. C. Devereux. *Metal Industry*, v. 66, Jan. 19, '45, pp. 36-38.

Industrial research has in the past few years become of increasing importance; it will be an essential factor in the maintenance of post-war industry. 1 ref.

25-25. **Organizing Knowledge of Materials.** B. C. Boulton. *Product Engineering*, v. 16, Feb. '45, pp. 73-78.

Presenting a method of organizing industry's information on old and new materials into factual data to meet engineering demands based on progress. Concrete suggestions are cited in an effort to crystallize thinking on the subject and to curtail the duplication of effort in various laboratories.

25-26. **Employee Selection in the Metallurgical Industry.** *Wire and Wire Products*, v. 20, Feb. '45, pp. 128-131, 150.

Job evaluation and determination of the physical and psychological characteristics.

26. STATISTICS

26-30. **Sees Need of Reimposing Four-Cent Duty on Foreign Copper Brought into United States after War.** Louis S. Cates. *Metals*, v. 15, Jan. '45, pp. 6-7.

Would prevent dumping of cheaply produced metal on our market; stockpiling bill, loosely drawn, needs revision.

26-31. **Lead Enters 1945 as a Critical Commodity; Industry and Government-Owned Stocks Low.** Irwin H. Cornell. *Metals*, v. 15, Jan. '45, pp. 8-9.

Consumption will have to be cut; need of larger imports raises question of adequacy of present price for foreign ore and metal; policy of exporting to allies also to fore.

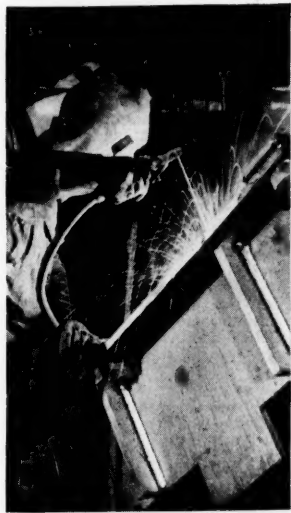
(Continued on Page 18)

NEW PRODUCTS IN REVIEW

ELECTRODE FOR HEAVY WELDMENTS

General Electric Co., Schenectady, N. Y.

A new heavily covered arc welding electrode for flat and horizontal fillet welding as well as for flat butt welding has been announced by this company. Desirable wherever weld requirements include high mechanical properties, rigid X-ray examination, good profile, high deposit rate, and good surface appearance, the applications of this electrode include pressure vessels and pertinent connections, heavy machine bases, and structural parts such as column plates, columns, roof trusses, beams and girders where the thickness of the section permits.



Known as Type W-27, this new electrode is characterized by an exceptionally

high melting rate which results in increased production and higher speeds at the same welding current as other electrodes. At comparable production speeds, it requires less input to the joint, thus reducing warpage and internal cooling stresses. The electrode operates on alternating current or direct current with either straight or reverse polarity. It has low spatter loss and easy slag removal and produces welds of excellent appearance. It is available in three sizes: $\frac{3}{16}$ x 18 in., $\frac{1}{4}$ x 18, and $\frac{5}{16}$ x 18 in., and is rated A.W.S. classes E6020 and E6030.

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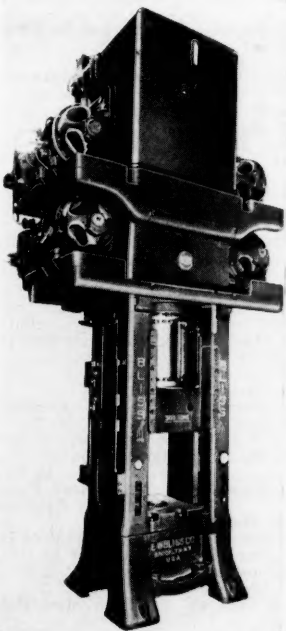
HIGH SPEED PRESS FOR SHELL NOSING

E. W. Bliss Co., 53rd St. and 2nd Ave., Brooklyn 32, N. Y.

A high speed hydro-dynamic press of 500 tons capacity has been built by this company for the nosing of 8-in. shells. These presses are equipped with a 400-hp. pumping unit providing a $\frac{1}{2}$ -sec. pressing cycle. This fast pressing cycle prolongs die life and at the same time insures uniformity of the product since contact of the dies with the hot work is reduced to a minimum. To aid fast operation the reversal is controlled by four-way valves of special design which permit a fast yet shockless reversal.

On some installations loading and unloading devices operating in automatic or electrically controlled sequence with the press cycle are provided to reduce the labor of handling the shells to a minimum. The press has a stroke of 24 in. and a bed area 40 x 37 in.

Mention R825 When Writing or Using Reader Service.



PROCESS FOR PLATING UPON ALUMINUM

The Enthone Company, Elm St., New Haven, Conn.

New, simple process for preparing aluminum for electroplating called "Alumon" is announced by this company. It enables electroplating of all types of aluminum. Both rack and bulk work can be processed.

The procedure consists in cleaning in the usual manner, followed by a short dip in the "Alumon" solution, which produces an active alloy base which can be subsequently copper or silver plated. After the work has been given a short copper plate it can then be electroplated with other metals including nickel, chromium, gold, etc.

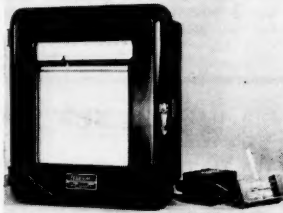
At present it is being used for plating of aluminum radar equipment and other apparatus. Work plated by the "Alumon" process can be subjected to severe distortion without flaking and the plate can be readily soldered, thus permitting easy soldering to work made of aluminum. The process is patented and the user is granted a license with no royalty payments other than the cost of the salts. Literature is available describing the process.

Mention R826 When Writing or Using Reader Service.

RECORDING INSTRUMENTS

Precision Scientific Co., 1750 N. Springfield Ave., Chicago 47, Ill.

A new group of recording instruments designated Televac has been announced by this company. The type MR instrument with a range of 0 to 500 microns utilizes the new Televac No. 500 thermal gage with specially treated elements. Features of latter include coated filaments to prevent "off calibration" periods due to water, oil vapor or other contaminating vapors; increased sensitivity gained through use of two filaments in both standard and variable tubes of the vacuum gage; all gages interchangeable without recalibration; and duplicate readings in terms of absolute pressure in microns.



The type "S" recorder for ultra vacuum contains two ranges—0 to 500 microns for pressures above 1 micron, utilizing the No. 500 thermal gage in this range, and an industrial type ionization gage for the range 0 to 0.4 micron. A new brochure is being prepared showing all high vacuum instruments and accessories now available.

Mention R827 When Writing or Using Reader Service.

IMPROVEMENTS IN RADIATION PYROMETER

Brown Instrument Co., Philadelphia, Pa.

Five improvements have been announced for this company's compensated radiation pyrometer to make it secure against air and gases up to 1 psi. gage pressure at temperatures up to 250° F. Known as Radiamatic, this radiation pyrometer is designed primarily to meet exacting needs of steel mills, metallurgical works and related industries.

The five improvements are: (1) The use of an adhesive sealing compound between the lens and mounting ring; (2) use of brass for lens retaining and mounting rings; (3) controlled torque is applied when assembling the lens retaining and mounting rings; (4) two spanner wrench holes in the lens mounting ring face have been replaced with a milled slot which avoids cutting through the ring face; and (5) use of a more positive sealing, with improved adhesive, of the sighting glass located in the rear of the thermopile assembly. Another improvement is the use of aluminum instead of cast iron for the Radiamatic housing.

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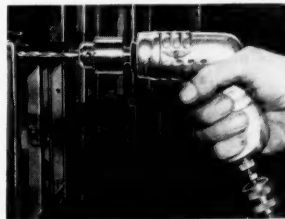
NEW DRILLS

The Aro Equipment Corp., Bryan, Ohio.

A new line of powerful drills with one-piece aluminum housing is announced by this company. The drills can be equipped with $\frac{3}{8}$ -in., $\frac{1}{2}$ -in. or $\frac{5}{8}$ -in. Jacobs chucks. Model 109, shown in the illustration, and Model 1010 operate at 2500 r.p.m.

Models 1013 and 1014 are 4000 r.p.m. for aircraft work and such jobs that require high speed and sustained torque. All tools have perfect balance and are built for 24-hour-a-day production. Important features in addition to the one-piece aluminum housing include built-in oilers; four-bladed rotors; hardened and ground cylinders; four-ball bearing construction; gears and gear cages precision cut and ground for perfect alignment, reducing gear wear to a minimum.

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SKIP TOOTH BAND SAW

W. O. Barnes Co., Inc., 1297 Terminal Ave., Detroit 14, Mich.

The new skip tooth band saw is designed for faster, easier cutting of magnesium, aluminum, soft brass and other non-ferrous metals, and for the cutting of other materials. The skip tooth provides greater chip clearance and is so shaped as to practically eliminate loading and clogging of the teeth, so common in the cutting of soft alloys with today's high speeds and heavy feeds. It is of hard edge, flexible back construction and fits any standard band saw machine.



Mention R830 When Writing or Using Reader Service.

PLATER'S CLEANER

Kelite Products, Inc., Los Angeles, Calif.

A new plater's cleaner with superior rinsing qualities is said to eliminate calcium scale. It is used in a hot tank, with or without current, for cleaning brass, bronze, copper, babbitt, pot metal and other non-ferrous metals.

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Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

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A.S.M. Review of Current Metal Literature — Continued

26. STATISTICS (Cont.)

- 26-32. **Aluminum to Remain in Forefront as Long as War Lasts; Many New Uses Found for Metal.** Arthur V. Davis. *Metals*, v. 15, Jan. '45, pp. 10-11.
United States output is at rate three times that of peacetime peak; large postwar civilian consumption anticipated.
- 26-33. **Manpower Shortage Looms as Big Problem for Zinc Production and Consumption during 1945.** Ernest V. Gent. *Metals*, v. 15, Jan. '45, pp. 12-15.
Output in 1944 fell below 1943 but consumption was higher; continued imports of concentrates necessary to meet needs.
- 26-34. **Stepping Up Ammunition Program in England Has Not Necessitated Larger Use of Copper.** L. H. Tarrington. *Metals*, v. 15, Jan. '45, pp. 16-17.
Work confined to filling shell cases already in store; lead control in building trade lifted; zinc supply ample.
- 26-35. **War Production Board Down on Use of Metals Following Reverses on Western Front; Manpower Short.** *Metals*, v. 15, Jan. '45, pp. 18-21, 32.
Reconversion to peacetime goods halted; more foreign copper to be imported; lead supply tight, new curbs imposed.
- 26-36. **Copper Production in 1944.** *Mining Journal*, v. 28, Jan. 30, '45, pp. 9-10.
Primary production of copper at the end of 1944 was at the lowest level since the third quarter of 1939; declines ranging from 9 to 12% in outputs of domestic mine, smelter and refinery copper are recorded when 1944 figures are compared with the record production of 1943. Consumption also declined.
- 26-37. **Tin Plate.** J. R. Mahoney. *Western Metals*, v. 3, Jan. '45, pp. 16, 18.
Qualities, western markets and possible production at Geneva.
- 26-38. **Precious Metals in the Pacific Northwest.** H. H. Engle. *Western Metals*, v. 3, Jan. '45, p. 26.
Gold and silver production; unforeseeable factors.
- 26-39. **Trend—As the Metallurgists See Light Metals.** D. Basch, J. D. Hanawalt, Paul P. Zeigler, E. W. Rouse, Walter Bonsack, I. W. Wilson. *Light Metal Age*, v. 3, Jan. '45, pp. 14-15, 36, 39.
Poll of representative leaders in the aluminum and magnesium industry, as to the position and potentialities of light metals for 1945 and the future.
- 26-40. **The Zinc Industry.** Arthur A. Center. *Mining & Metallurgy*, v. 26, Feb. '45, pp. 67-68.
New plants and improvements, here and abroad.
- 26-41. **Metallurgy of Copper.** Joseph Newton. *Mining & Metallurgy*, v. 26, Feb. '45, pp. 69-70.
Production still the problem, with metallurgical innovations few.
- 26-42. **Iron and Steel Process Metallurgy.** Michael Tenenbaum. *Mining and Metallurgy*, v. 26, Feb. '45, pp. 82-86.
Practice gradually returning to normal; improvements varied but minor.
- 26-43. **Base Metal Markets.** *Metal Industry*, v. 66, Jan. 5, '45, pp. 8-9.
Review of activities in 1944.
- 26-44. **Steel in the West.** *Fortune*, v. 31, Feb. '45, pp. 130-133, 258-261.
Pacific Coast industry is in full revolt against its steel differential. With the aid of two new plants built for war, it will win its fight.
- 26-45. **Metal Production Figures for 1944.** *Mining Journal*, v. 28, Feb. 15, '45, pp. 6-12, 43-48.
Preliminary figures indicate that the mine production of gold, silver, copper, lead, and zinc, in the Western United States and Alaska in 1944, had a total value of \$407,816,036, compared to \$448,630,530 in 1943. Arizona continued as the leading copper producing state; Utah ranked first in gold output; and Idaho led all of the western states in the production of silver, lead, and zinc.
- 26-46. **Outlook for Magnesium Castings.** Ward Grantham. *Modern Metals*, v. 1, Feb. '45, pp. 22-23.
Future of magnesium.
- 26-47. **Gold.** *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 95, 96.
Outlook for stable gold industry more promising. Purchasing policies likely to stay unchanged. Foreign countries better supplied.
- 26-48. **Silver.** Humfrey Michell and Herbert M. Bratter. *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 97-99.
A discussion of silver with divergent views on the monetary aspect.
- 26-49. **Lead.** Alfred L. Ransome. *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 100-101.
High consumption eats into stocks as mine output declines.
- 26-50. **Copper.** H. H. Wanders. *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 101-103.
All-out for war as year ends. Consumption in 1945 expected to establish new high. Purchases from abroad to be larger.
- 26-51. **Zinc.** Evan Just. *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 103-104.
Production continued to outstrip consumption. Reserve supply at year-end substantial. Conservation order eased by War Production Board.
- 26-52. **Tin.** H. H. Wanders. *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 104-105.
Supply outlook for 1945 expected to show little change. Strict conservation to continue until production increases.
- 26-53. **Minor Metals.** *Engineering and Mining Journal*, v. 146, Feb. '45, p. 105.
Good markets for group provided by expanding demand for military and essential civilian requirements.

- 26-54. **Ferro-Alloys.** Edwin Jenckes. *Engineering and Mining Journal*, v. 146, Feb. '45, p. 109.
The emphasis is no longer on vanadium, tungsten, and molybdenum. Alloy steel now easier; industry co-operation cited.
- 26-55. **Minor Metals Livest Topic in Non-Ferrous Metallurgy.** Carle R. Hayward. *Engineering and Mining Journal*, v. 146, Feb. '45, pp. 123-125.
Urgency for full production inhibited advances in metallurgy of major metals, but indium, calcium, lithium, and others have found important uses and quantity production of them seems a possibility. High vacuum techniques studied.

27. NEW BOOKS

- 27-29. **The Electronic Engineering Handbook.** Edited by Ralph R. Batchner and William Moulic. 456 pp., illus., diagr., Electronic Development Associates, 125 East 46th St., New York 17.
Fundamental principles of electronic design. A working reference for specialists in electron tube applications, particularly industrial phases rather than the communication field.
- 27-30. **Review of Iron & Steel Literature.** E. H. McClelland. *Blast Furnace & Steel Plant*, v. 33, Feb. '45, pp. 241-246.
Twenty-eighth annual review of iron and steel literature. Lists books and pamphlets published during 1944.
- 27-31. **Vakuumtechnik in Laboratorium.** Gunther Monch. 218 pp., illus. (Glasensinstrumentenkunde, v. 3) J. W. Edwards, Ann Arbor, Mich. \$5.00.
- 27-32. **Engineering Contracts and Specifications.** Robert W. Abbott. 195 pp., John Wiley & Sons, New York. \$2.25.
Presentation of the legal and business aspects of the engineering profession.
- 27-33. **Aircraft Mechanical Drawing.** D. J. Davis and C. H. Goen. 259 pp., illus., diagr., McGraw-Hill Book Co., New York. \$2.50.
A course in the basic principles of mechanical drawing, a prerequisite to the study of detail drafting in aircraft engineering.
- 27-34. **Production Engineering in the Aircraft Industry.** A. B. Berghell. 318 pp., diagr., McGraw-Hill Book Co., New York. \$3.00.
A textbook which is the outgrowth of courses on production engineering and aircraft statistics taught by the author under the Engineering, Science and Management War Training Programs at the University of Southern California and the University of California at Los Angeles.
- 27-35. **Theory of X-Ray Diffraction in Crystals.** William H. Zachariasen. 225 pp., illus., John Wiley and Sons, New York. \$4.00.
Both the theory of space lattices and their symmetry properties and the theory of X-ray diffraction in crystals are discussed in this advanced textbook for graduates of physics and chemistry. Higher mathematics is a prerequisite. Bibliographic references to additional material on crystal structure are included.
- 27-36. **American Malleable Iron—a Handbook.** 367 pp., illus., Malleable Founders' Society, Union Commerce Bldg., Cleveland 14, Ohio. \$4.00.
Standard malleable iron and its properties, pearlitic; special and cupola malleable irons; malleable casting design; pattern design; machining practice; recommendations to users; manufacture and metallurgy of malleable iron; history; applications. Appendices cover specifications, protective coatings, bibliography, glossary, engineering tables and data.



CHAPTER MEETING CALENDAR

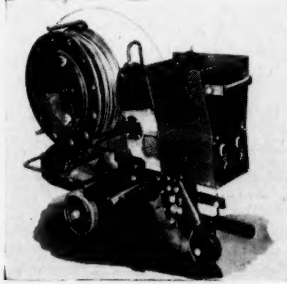
CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Apr. 16	Engineers Club	Edward S. Bunn	Magnesium
Birmingham	Apr. 3		Arthur E. Focke	Fatigue of Metals
Boston	Apr. 6		Joint Meeting with Army Ordnance Association	
British Columbia	Apr. 3	Brock Memorial Bldg., Vancouver, B. C.	T. R. Stanley	Modern Foundry Practice at Trail
Buffalo	Apr. 12		C. E. Betz	Present Trends in Magnetic Particle Testing
Calumet	Apr. 10	Vogel's Restaurant, Hammond, Ind.	E. S. Davenport	Isothermal Transformation in Steel
Canton-Mass.	Apr. 12	Elks Club	V. N. Krivobok	What Progress Have We Made in Stainless Steels
Cedar Rapids	Apr. 10	Roosevelt Hotel	A. S. Jameson	Bolts, Materials, Treatment and Properties
Chicago	Apr. 12	Chicago Bar Assoc.	C. A. Furgason	Causes and Prevention of Failures in Forgings
Cincinnati	Apr. 12	Engineering Society	W. H. Mather	Mechanical Properties of Austenitic Stainless Steel
Cleveland	Apr. 2	Cleveland Club	E. O. Dixon	Forging and Its Effect on Metal Properties
Columbus	Apr. 10	Fort Hayes Hotel	H. Miller	Origin of Low Alloy Steels
Dayton	Apr. 11	Engineers Club		Home Talent Night
Detroit	Apr. 9	Rackham Bldg.	Harry J. Ihrig	Manufacture and Use of Seamless Steel Tubes
Eastern N. Y.	Apr. 10	Aurania Club, Albany	Chas. W. Briggs	Steel Castings
Fort Wayne	Apr. 24	Chamber of Commerce	O. W. McMullan	Selection of Metals
Georgia	Apr. 2	Duchess Coffee Shop, Atlanta	Arthur E. Focke	Fatigue of Metals
Hartford	Apr. 10	Hartford Electric Light Co.	Gosta Vennerholm	Wartime Developments in Iron and Steel Casting
Indianapolis	Apr. 16	Y. W. C. A.	F. G. Tatnall	Physical Testing and New Developments in Testing Equipment
Lehigh Valley	Apr. 6	Hotel Bethlehem	R. M. Burns	Corrosion
Los Angeles	Apr. 26	Scully's Cafe	H. Stagg	Practical Tool Hardening
Louisville	Apr. 17	Kentucky Hotel	M. A. Grossmann	Hardenability Testing and Effects of Alloys on Hardenability
Mahoning Valley	Apr. 10	Dinner Bell, Youngstown	E. M. Schrock	Fancy Figures and Facts
Manitoba	Apr. 12	Marlborough Hotel, Winnipeg	H. B. Chambers	Manufacture of Electric Furnace Steel
Milwaukee	Apr. 17	Athletic Club	Russell Franks	Corrosion Resisting Alloys
Montreal	Apr. 2	Queen's Hotel	S. C. Spalding	Application and Heat Treatment of Tool Steels
Muncie	Apr. 11	Y.M.C.A., Anderson, Ind.	Dr. Balke	Refractory Metals
New Haven	Apr. 19	Hotel Barnum, Bridgeport, Conn.	B. F. Shepherd	Martempering
New Jersey	Apr. 16	Essex House, Newark	F. H. Clark	Powder Metallurgy
New York	Apr. 9	2 Park Ave., 26th Floor	James P. Gill	Precision (Lost Wax) Castings
North West	Apr. 17	University of Minnesota	C. E. Betz	Die Casting
Notre Dame	Apr. 11	Engineering Auditorium, Univ. of Notre Dame	J. A. Rassenfoss	Modern Methods of Treating High Speed Steel
Ontario	Apr. 6	Royal York Hotel, Toronto	W. B. Stout	Interpretation and Evaluation of Indications in Magnetic Particle Testing
Ottawa Valley	Apr. 3	National Museum, Ottawa	S. C. Spalding	Applications of Steel Castings
Philadelphia	Apr. 27	Engineers Club	E. A. Snader	Aircraft Developments
Pittsburgh	Apr. 12	Roosevelt Hotel	N. L. Mochel	Inspection by Magnetic Particle Methods
Puget Sound	Apr. 18	Washington Athletic Club	C. G. Stephens	Inspection by X-Ray and Gamma Ray
Rhode Island	Apr. 4		W. J. Reagan	Steel Making—Open-Hearth Vs. Electric Furnace
Rochester	Apr. 9	Lower Strong Aud., Univ. of Rochester	Howard Stagg	Tool Design With Relation to Tool Steels
Rockford	Apr. 18	Faust Hotel	A. P. Seasholtz	Use of Salt Baths in Interrupted Quenching
Rocky Mountain	Apr. 19	Whitman Hotel	A. H. Jennings	Distortion Problems in Welding
Pueblo	Apr. 20	Albany Hotel	S. L. Hoyt	Physical Testing and Metallography
Denver	Apr. 17	Fischer's Hotel, Frankenmuth, Mich.	L. T. Work	Thermit Welding
Saginaw Valley	Apr. 17		L. T. Work	Thermit Welding
Southern Tier	Apr. 16	Mineral Springs Hotel, Alton, Ill.	J. McElgin	Electronics
St. Louis	Apr. 19		Albert A. Hoffman and John M. Birdsong	Martempering
Springfield	Apr. 16	Mansion House, Greenfield, Mass.	H. Williams	Metallurgical Factors in Surface Hardening—Induction Heating
Syracuse	Apr. 3	Onondaga Hotel	Stewart M. DePoy	Comparison of Brass and Steel in Rolling and Treating
Texas	Apr. 19		G. B. Berlien	Sub-Atmospheric Treatment of Alloy Steels
Toledo Group	Apr. 25	Toledo Yacht Club	E. E. Thum	Practical Heat Treating
Tri-City	Apr. 10			Some Thoughts on the Influence of Air Power on Future History
Warren	Apr. 12	I. O. O. F. Hall	V. N. Krivobok	Corrosion and Prevention
Washington	Apr. 9	Dodge Hotel	J. P. Gill	Annual Party
West Michigan	Apr. 16	Rowe Hotel, Grand Rapids	M. F. Judkins	Tool Steels
Worcester	Apr. 11	Hotel Sheraton		Carbide Cutting Tools
York	Apr. 11	Harrisburg, Pa.	Russell Franks	Ladies' Night
				Resisting Steels
				Forging and Rolling

NEW PRODUCTS IN REVIEW

NEW METALLIC ARC WELDING PROCESS

Lincoln Electric Co., Cleveland 1, Ohio.

A new type of automatic welding known as "Lincolnweld" has been announced to meet the need for a more foolproof and more easily applied process. Over a period of several years the process has been highly successful in welding a variety of products, among which are machinery bases and beds, motor and generator frames, ventilating fans, tanks and pressure vessels and many parts used in the prefabrication of ships, railroad cars, and other structures.



The process is used with direct current, utilizing a bare metallic electrode which is fed through a granular flux deposited on the joint to be welded. Sufficient flux is applied to blanket completely the arc and the molten metal; the unfused flux is then reclaimed for further use. Direct current offers many important advantages over alternating current, such as a more simplified and positive control, ability to weld non-ferrous materials, and better control of electrode melting rate through the option of either straight or reverse polarity.

Extremely high current densities are used. For example, a 1/4-in. diameter electrode may carry as much as 650 amperes. This produces greater penetration and permits smaller cross section of weld metal with resulting saving in cost and reduced warpage and distortion. Users report that the "Lincolnweld" process is less sensitive to scale and moisture than conventional automatic welding methods. This eliminates or reduces plate cleaning prior to welding. In extreme cases of scale, buffing with power wire wheel usually provides sufficient edge cleaning, whereas grinding and sand blasting might have been required formerly.

The "Lincolnweld" process meets the welding codes, rules, regulations and specifications sponsored by the A.S.M.E. Power Boiler Code; A.P.I.-A.S.M.E. Unfired Pressure Vessel Code; Rules of American Bureau of Shipping; Lloyd's Register of Shipping Regulations; and the United States Maritime Commission.

With this process one type and grade of flux, together with one analysis of electrode, can be used with the same procedure for a wide range of steel analyses. For example, ingot iron and steels up to 0.40% carbon can be welded with the same procedure. Thus, special joint preparations, changing of flux, wire analysis and welding procedure are eliminated, which is of tremendous importance to a manufacturer using automatic welding.

The equipment will take 1/4-in. to 1/2-in. electrode without change of drive rolls, wire contacts or control. The control is extremely simple and quick acting, there being no vibrating relays or electronic devices. The electrode will feed in either direction by means of the wire motor being controlled through a special exciter.

The welding head is normally used in conjunction with a specially built automatic welding set of 1200-ampere capacity. The current rheostat in the automatic control box permits a current range of 300 to 1200 amperes. The unit has two exciters, one for the automatic head control and one for the welder field excitation. The welder control box has provisions for easy and quick wiring of the automatic.

This welding head is shown mounted on a portable tractor unit in the illustration. This has a straight wire guide for butt welding. For square butt welding a pointer is used for following irregular seams.

The standard head is changed from butt to fillet welding in a matter of only a few minutes. In making fillet welds the lower wire guide and flux tube are changed from straight to curved, thus permitting the head and wire reel to be left in its normal position. The wire is fed in at 40° from horizontal which gives the maximum effective throat for horizontal fillet welds. It is expected that the new "Lincolnweld" process will revolutionize all ideas regarding the application of automatic arc welding by making possible not only many new uses for this process, but also permitting greatly improved welding speed in applications for which it is designed.

Mention R832 When Writing or Using Reader Service.

SAPPHIRE GAGES

Sapphire Products Division,
Elgin National Watch Co., Aurora, Ill.

Amazing resistance to wear is the outstanding characteristic of sapphire plug and ring gages—they are said to outlast the hardest steel alloy and cemented carbide gages hundreds of times over. Since production of these gages was started more than a year ago, no sapphire gage has yet been known to wear out. Many readers learned this story at the Elgin exhibit at the Cleveland National Metal Show.

Inherent properties of sapphire account for its superior performance when used in gaging. Next to the diamond, it is the hardest substance on the mineral hardness scale.

Because of that, sapphire plug and ring gages can be ordered in the exact size needed, with no wear allowance required. Moreover, sapphire is not affected by any chemical ordinarily encountered in gaging. Sapphire gages are remarkably strong and stand up well under ordinary shock of handling in use. Since they are not subject to burring, it is impossible to gage parts inaccurately as a result of unnoticed damage to a gage.

Mention R833 When Writing or Using Reader Service.

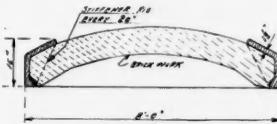
MEEHANITE CASTINGS FOR SOAKING PIT COVERS

Meehanite Research Institute of America, Inc.,
Pershing Square Bldg., New Rochelle, N. Y.

War-time necessity has forced many radical changes in engineering thinking involving the possible success of unusual applications for high duty iron castings. A typical example of this is found in a new application for Meehanite Castings in the construction of soaking pit covers. These have been in service more than a year and it is now possible to evaluate the success of the application.

Normal soaking pit cover design calls for steel castings which at the time could not be secured. As a matter of necessity engineers decided to construct the pit covers from Meehanite castings for the side beams, end beams and the center brace. Over-all dimensions of the covers were 13 x 8 ft. as illustrated. Ten complete covers were cast and eight put into immediate service. In addition, during construction of the furnaces the base plates upon which they were supported were also cast in Meehanite.

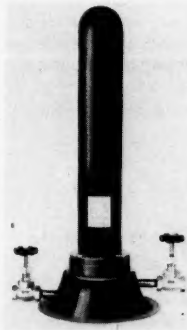
Mention R834 When Writing or Using Reader Service.



GAS PURIFIER

Baker & Co., Inc., Newark, N. J.

This newly developed gas purifier utilizes the precious, but unrestricted, metal palladium as a catalyst that operates at room temperature and, together with a supplementary portable analyzer now being perfected, provides many war and other industries with a new opportunity to reduce waste.



Named the Deoxo gas purifier, it is efficient in removing oxygen from such gases as hydrogen, nitrogen, argon and neon. While uses of the new development are manifold it is important to heat treatment of alloys, powder metallurgy and all research laboratories using pure gases.

The unit will be produced in two sizes. Both are compact,

containing the catalyst encased in metal cylinders provided with intake and outlet valves through which the gas is passed. One, standing 20 in. high, is designed for laboratory and limited production use. It has a capacity of 200 cu. ft. of gas per hr. The other, for general plant operation, measures 40 in. high and is constructed for wall mounting. Its capacity is 1,000 cu. ft. of gas per hr.

Up to the present time, the usual method of removing oxygen is to pass the gas over copper filings or a platinum asbestos catalyst at temperatures which may be as high as 600° C. Careful control is required to insure good removals, and long periods of time are needed for heating up and cooling down processes under this method. On the other hand, this new unit requires no external heating since it employs a new type of palladium catalyst efficient at room temperatures. It requires no warming up or cooling down period before and after use. Flow resistance is almost negligible and will not change with use. It requires no maintenance and present indications are that, when used on cylinder gas, it should last indefinitely.

Mention R835 When Writing or Using Reader Service.

SOLID COPPER DIAMOND TOOLS

Cleveland Industrial Tool Corp.,
4713 Euclid Ave., Cleveland, Ohio.

Heat generated in the dressing operation tends to reduce the diamond's efficiency, loosen the stone in the setting, and often causes the stone to crack. Adequate cooling fails to lick this problem completely, according to this company. Realizing the enormous heat-conducting quality of solid copper, it is producing a new solid copper diamond dressing tool that features diamonds set in solid copper shanks as well as solid copper matrices.

Repeated tests have shown that these tools not only throw off the effects of great heat rapidly, but also clamp the diamond more firmly in the setting. Tests thus far have shown the life of an average diamond to be much longer than that of a stone of comparable value set in the usual type steel or sintered shank.

Mention R836 When Writing or Using Reader Service.

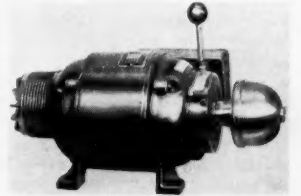
NEW POLISHING LATHE

Crozier Machine Tool Co.,
684 North Prairie Ave., Hawthorne, Calif.

This new polishing lathe handles parts such as oil can bodies, spun shapes, and flat stampings which cannot be held by chuck or collet—parts of copper, brass, aluminum, magnesium, zinc, and plastic as well as steel.

It generates its own vacuum, without piping or glands; starts, holds the work, stops instantly, releases the work rapidly for low cost production. All work is held firmly for polishing and burnishing and many other operations. The lathe is furnished with an 1800 or 3600 r.p.m., 220 to 440 or 550-volt 3-phase 50 or 60-cycle motor.

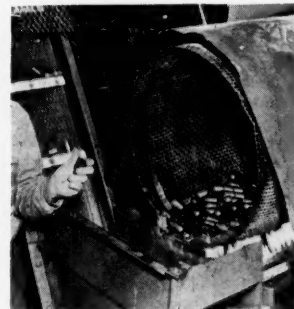
Mention R837 When Writing or Using Reader Service.



DRY DRAWING AND ANNEALING COMPOUND

Plasteel Corp.,
3900 West Jefferson Ave., Ecorse 18, Mich.

A dry drawing and annealing compound identified as No. 268, that is applied as a waxy, aqueous emulsion, is announced by this company for use in the deep drawing of brass and steel.



This compound is applied in varying strength to give a very nearly imperceptible wax coating. The compound is designed to be applied in either a drum or spray type mechanical washing machine at an operating temperature of 175 to 185° F. The pieces to be run should be clean, coming either from

the pickle line or from the wash. When correctly applied, the metal, after drying and cooling, should have a thin, almost indistinguishable, uniform coating of the compound, hardly visible but with a slightly waxy feel to the surface.

This coating contains sufficient annealing compound to prevent the formation of hard mill scale during anneal, but does produce a thin, porous, protective scale that is easily removed in subsequent pickling, leaving a clean, scale-free piece. This applies equally well to minutely imbedded hard scale that might have been on the piece before the drawing operation. The pieces can be drawn as they come from the washing machine, without the use of a coolant or added lubricant. This gives a final product that is smooth and clean, and if two draws in sequence are desired, it generally has been found unnecessary to re-apply the drawing compound before the second draw, there being sufficient residual compound left from the first draw to lubricate the punch and die satisfactorily for the second operation. Naturally when there is a cleaning, annealing or pickling operation interposed between the two draws, it will be necessary to re-apply, since the cleaning, annealing or pickling will remove the compound. Illustration shows the rough extrusion coming from washing machine after No. 268 has been applied; these pieces are now ready for the deep drawing operation.

Mention R838 When Writing or Using Reader Service.

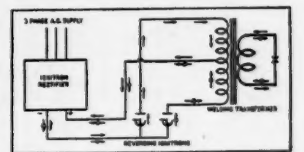
THREE-PHASE RESISTANCE WELDER

Sciaky Brothers, 4915 W. 67th St., Chicago 38, Ill.

A new principle for the spot welding of steel in heavy gages with a balanced three-phase load has been announced by this company. As shown in the diagram, all three phases of the a.c. line current are rectified to d.c. and supplied to the welding transformer through a system of reversing ignitron tubes. These tubes allow the current to pass through the center tapped primary first in one direction and then in the other. Thus, the induced welding current in the secondary is a continuous alternating impulse of low frequency—of ideal wave shape and magnitude.

This system helps overcome limitations encountered where single phase a.c. welders are subject to heavy loads. These are disturbance to the usual 3-phase supply by the unbalanced load, the heavy reactive load, which results in low power factor, and the high power demand. Power installation and operating costs are reduced by providing (1) a balanced three-phase load, (2) operation at near unity power factor, and (3) decreased power demand.

Mention R839 When Writing or Using Reader Service.



MANUFACTURERS' CATALOGS IN REVIEW

Quality Control Handbook

Continental Machines, Inc.,
1301 Washington Ave., South, Minneapolis 4, Minn.

"Quality Control" is the title of the new pocket size handbook on scientific inspection just published by this company. This case-bound handbook presents a concise explanation of scientific inspection through controls offered by precision measuring instruments. The use of over 200 photographs, diagrams, charts, and tables makes the explanation of scientific inspection interesting and informative. Of great interest are the many conversion tables and measuring data which give pertinent information for the precision measuring methods required in scientific inspection.

One section contains 35 subjects vital to quality control which are highlighted with examples showing how to use the precision measuring instruments. Among the precision instruments and methods shown for quality control are the new mobile inspection units, sine bars, vernier gages, optical flats, comparator gages, etc. Another section of the book contains 64 key questions, along with their answers, which serve both as a check and test of the knowledge gained by the reader in studying this handbook. This 140-page book will be of particular value to plant inspection departments checking new ways to establish quality control over their products.

Mention R840 When Writing or Using Reader Service.

Safety Heaters

Precision Scientific Co.,
1750 N. Springfield Ave., Chicago 47, Ill.

For the difficult job of heating complex glassware set-ups involving distillation columns, cumbersome flasks, delicate reflux condensers, and other costly glassware, these safety heaters are described in this leaflet as offering operating safety and easy handling. Many valuable suggestions dictating the practical design of these heaters came from prominent laboratories in diverse fields. This leaflet illustrates use of the heaters and includes a temperature chart showing the use of the safety heater.

Mention R841 When Writing or Using Reader Service.

Rust—Causes and Prevention

E. F. Houghton & Co.,
308 West Lehigh Ave., Philadelphia 33, Pa.

Proper packaging to preserve metal parts against the ravages of corrosion became critically acute when the armed forces depended on such packaging of vital war materials. What has been learned under the stress of the war emergency will benefit distribution to world markets during the years to come.

Rust preventives, a major element in the broad subject of packaging, is the particular phase of the problem which this company discusses in this 72-page booklet. No attempt is made to cover the entire packaging problem, but this handbook will be found to be very complete in its discussion of the causes and prevention of corrosion of metals, including the necessity for and methods of proper cleaning prior to application of preventives. The book includes eight chapters with titles as follows: Corrosion (Rust) Prevention; Cleaning—Needs and Methods; Corrosion Preventive Materials; Choice of Corrosion Preventives; Application; Treatment of Corrosion Preventive Films; Protection of Idle Machinery; and Houghton Corrosion Preventives. The book is well illustrated and contains many charts and tables.

Mention R842 When Writing or Using Reader Service.

Silver-Solder-Backed Contacts

Gibson Electric Co.,
8362 Frankstown Ave., Pittsburgh 21, Pa.

This new four-page leaflet covers silver-solder-backed contacts in Gibsily and silver for brazing. The construction and advantages of solder-backed contacts and various methods of brazing are described in detail. Listings and illustrations of standard forms and sizes in which solder-backed contacts can be furnished are shown. Also illustrated are typical assemblies of solder-backed contacts with various types of contact supports commonly used in electrical control apparatus. A table lists the characteristics of various Gibsily powder metal contact materials.

Mention R843 When Writing or Using Reader Service.

Industrial Cleaning Equipment

Optimus Equipment Co., 171 Church St., Matawan, N. J.

This bulletin, No. 4E1, describes a line of washing, rinsing, pickling and drying equipment for metal parts with complete manufacturing and engineering service offered, covering units from the smallest portable type to complete automatic equipment including an entire series of metal cleaning and allied process operations.

The leaflet includes a series of cross-sectional sketches showing four standard units and four special units with details of construction and operation. Special attention has been given to design to a possible change-over from war to peacetime production. All machines can be heated by any fuel depending on shop facilities.

Mention R844 When Writing or Using Reader Service.

Revised Metal Washing Machine Circular

American Foundry Equipment Co.,
555 South Byrkit St., Mishawaka, Ind.

Bulletin No. 19 which describes the American Tabl-Spray metal washing machine has been revised to incorporate new developments in the equipment. This machine is designed to meet the need for high speed washing of flat, fragile work or circular parts with intricate pockets and crevices. Parts to be cleaned are placed on a mesh table in a totally enclosed cabinet and rotated through high pressure spray solutions, discharged from special machined non-clogging nozzles.

Operating sequences, mechanical features, construction specifications and details are fully covered in the bulletin. Schematic drawings and diagrams are included to illustrate the thorough spray cleaning action on the parts to be cleaned. Briefly described is the extensive metal cleaning laboratory of this company.

Mention R845 When Writing or Using Reader Service.

Glass Tanks

Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh 19, Pa.

These glass tanks are manufactured from heavy plates of specially heat treated glass having the highest type of resistance to chemicals. Several types of tanks are illustrated suggesting many applications. Pittsburgh tanks are made in two general sizes: The first, an all-glass or transparent type, made in moderate sizes; second, metal or wood shells lined with glass, made in somewhat larger sizes, both types being manufactured complete and shipped ready to put into service. Shown are glass-lined tanks used in the cleaning of heavy engine parts, heavy-duty copper pickling tanks, opaque white Carrara glass tanks used with revolving barrels for the silver plating of small metal parts and glass-lined tanks for electroplating that assure absence of electric losses.

Mention R846 When Writing or Using Reader Service.

Heat Treating With Ammonia

Pennsylvania Salt Mfg. Co.,
1000 Widener Bldg., Philadelphia 7, Pa.

This 16-page booklet is presented as an aid to heat treaters in the safe handling of anhydrous ammonia. Well illustrated and containing several charts, the booklet discusses the ideal container for anhydrous ammonia, its use in connection with nitriding, cracked ammonia, properties of anhydrous ammonia, vaporization outside the original container, testing for leaks, and first aid.

Mention R847 When Writing or Using Reader Service.

The Steel Castings Industry

Steel Founders' Society of America,
920 Midland Bldg., Cleveland, Ohio

This 64-page booklet is a pictorial survey of the steel castings industry. So great were the demands for steel castings for the war program that both capacity and personnel were more than tripled and production quadrupled. One of the outstanding achievements of the entire war program was the development of cast armor steel parts for tanks. Steels having high ballistic impact resistance for making the streamlined turrets, hulls, transmission cases and dozens of other exposed parts were developed and produced in steel foundries. A partial survey of the industry made two years after Pearl Harbor showed 41 foundries had been awarded the Army-Navy "E" Flag for excellence in war production.

This book illustrates steel castings used in such fields as aircraft, railroads, power, metal-working and other related industries. The research and design that has gone into the steel casting industry is outlined and the various steps in production such as pouring, heat treating, machining are described and illustrated.

Mention R848 When Writing or Using Reader Service.

Plaster Mold Castings

Briggs Mfg. Co., Nonferrous Castings Div.,
12825 Taft Ave., Cleveland 8, Ohio

This 8-page leaflet describes developments leading to the operation of a large new foundry by this company, utilizing plaster molds exclusively, licensed under the "Capaco Castings Process". Production of plaster mold castings is described and pictured and four standard alloys Briggs is now using are detailed. These are No. 10 Briggs high strength yellow brass, No. 70 Briggs manganese bronze, No. 100 Briggs manganese bronze and No. 355 Briggs aluminum.

Mention R849 When Writing or Using Reader Service.

Guide to Correct Instrument Selection

Taylor Instrument Companies, Rochester, N. Y.

To assist users in determining the instrument suited to requirements, this 24-page guide is divided according to the variables to be measured or controlled. The booklet describes the three basic types of Taylor instruments and then details them according to applications such as temperature, pressure, special functions, etc.

Mention R850 When Writing or Using Reader Service.

Hydraulic Bending and Beveling Machines

Hufford Machine Works, Inc., Redondo Beach, Calif.

This bending and beveling machine contours and bevels extrusions, rolled sections, flat strips, and sheet stock up to 10 in. wide and of many materials by the new principle of stretch forming. Literature describes and illustrates how the workpiece is placed under a heavy tension, exceeding the elastic limit of the metal, and at the same time is bent or simultaneously bent and beveled around a stationary form block.

Mention R851 When Writing or Using Reader Service.

Carbide-Tipped Cutting Tools

Wendt-Sonis Co., Hannibal, Mo.

Many carbide-tipped cutting tools generally classified as "special" are now listed as standard in this new Catalog No. 144. These new tools are not adaptations of existing high speed tool designs but are specially designed for carbide tip construction. In redesigning standard tools, the company has also lengthened the carbide insert on all round tools approximately 25%. As a result of the addition of these tools, the redesigning of many others and the addition of engineering data, the new catalog has expanded to 48 pages. Tools included in the catalog are spiral reamers, jobber reamers, stub taper spot facers and counterbores, straight shank end mills and many others.

Mention R852 When Writing or Using Reader Service.

Unichrome Alkaline Copper Plating

United Chromium, Inc.,
51 E. 42nd St., New York 17, N. Y.

Informative 6-page booklet describes the Unichrome Alkaline Copper Plating Process which has recently been installed for a wide variety of operations. The leaflet contains a plating speed table, showing the time required to obtain various thicknesses as well as the wide range of current densities at which the process can be operated.

Mention R853 When Writing or Using Reader Service.

Air Processing Equipment

Peters-Dalton, Inc., 628 E. Forest Ave., Detroit 1, Mich.

This new 56-page, spiral-bound catalog shows innumerable installations of dust collecting units and systems, spray booths and equipment, ovens and ventilating systems, and completely engineered air processing systems. It tells an interesting story of this company's complete engineering facilities, and includes detailed specifications of Hydro-Whirl dust collectors and spray booth units together with engineering data of immeasurable value to those with air handling problems.

Mention R854 When Writing or Using Reader Service.



Index to Advertisers

	Page
Buehler, Ltd.	8
Burdett Manufacturing Co.	11
Cherry Rivet Co.	14
Continental Machines, Inc.	13
DuBois Company	5
Electric Furnace Co.	10
Electro-Alloys Co.	11
Harshaw Chemical Co.	7
Hevi Duty Electric Co.	11
Huppert Co., K. H.	11
Kelite Products, Inc.	5
Kennametal, Inc.	14
Lindberg Engineering Co.	8
MacDermid, Inc.	5
Martindale Electric Co.	15
Ohio Steel Foundry Co.	11
Precision Scientific Co.	9
Quaker Chemical Products Corp.	15
Rustless Iron & Steel Corp.	13
Ryerson & Son, Inc., Joseph T.	7
Stanwood Corp.	11
Tinnerman Products, Inc.	16
Toledo Scale Co.	9
Turco Products, Inc.	5
Warner Electric Co.	7

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